Carleton Ravens OUA Basketball Analytics Report

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Introduction

The Carleton Ravens are the athletic teams that represent Carleton University in Ottawa, Ontario, Canada. Carleton has had less success in women's basketball compared to men's basketball, though the program has recently become one of the most competitive in the OUA (Ontario University Association) North. However, the women's team was very successful last season, going 23-0 in the regular season and winning the championships. With Head Coach Taffe Charles and the 2018-2019 roster, hopefully the team can do the same this year.

Basketball is a game of endurance, athleticism, intelligence and strategy, The game is a combination of athletic ability and knowledge. Knowledge is a very important factor because it provides awareness. Being prepared to face the opponent and adjust or force them to adjust to a particular style of play, knowing what strategy to use (e.g. small-lineup, big line-up,etc), and knowing what plays to run can significantly contribute to winning basketball games. A tool used to get this knowledge is basketball analytics.

Sports analytics has been a trending topic for the past few decades. Many professional teams are taking advantage of analysts to help them win games.In the NBA, all the teams have hired analysts, researchers and strategists. Basketball analytics is about using different types of data to solve a problem you have and making better decisions in order to win games.

The main goal of this report is to provide insights for the Carleton Ravens women's basketball team through the use of descriptive and predictive statistics. The two sources of data that are used are the statistics from the OUA website (http://www.oua.ca/sports/wbkb/2018-19/teams?sort=&r=0&pos=off) and also from Synergy Sports Technology (https://corp.synergysportstech.com/)

At the time of writing, the University Basketball Regular Season is more than halfway through. These are the standings as of January 20th 2019.

2018-19 OUA Women's Basketball Standings

EAST	GP	PTS	W-L	PCT	PF	PA	L10	STRK
Ottawa	16	28	14-2	0.875	1273	915	9-1	Won 4
Ryerson	16	28	14-2	0.875	1204	882	8-2	Won 5
Carleton	16	26	13-3	0.813	1070	868	8-2	Won 3
Queen's	16	18	9-7	0.563	1097	986	4-6	Lost 2
Laurentian	16	12	6-10	0.375	1005	1066	4-6	Won 1
York	16	12	6-10	0.375	1067	1110	2-8	Lost 3
Toronto	16	8	4-12	0.250	985	1135	3-7	Lost 1
Nipissing	16	6	3-13	0.188	885	1148	3-7	Lost 4

WEST	GP	PTS	W-L	PCT	PF	PA	L10	STRK
McMaster	16	28	14-2	0.875	1231	988	9-1	Won 8
Lakehead	16	24	12-4	0.750	1167	1036	4-3	Lost 3
Windsor	16	20	10-6	0.625	1096	1002	7-3	Won 3
Brock	16	14	7-9	0.438	1013	1080	4-6	Lost 2
Laurier	16	12	6-10	0.375	963	1079	4-6	Won 2
Guelph	16	10	5-11	0.313	1104	1153	2-8	Lost 1
Western	16	10	5-11	0.313	863	1116	4-6	Won 4
Algoma	16	8	4-12	0.250	879	1119	2-5	Lost 4
Waterloo	16	8	4-12	0.250	852	1071	3-7	Lost 3

Figure 1: 2018-2019 OUA Women's Basketball Standings.

The Carleton Ravens Women's team is in third with a record of 13-3. In the East we have uOttawa and Ryerson tied for first and in the West we have McMaster in first.

In this report we will try to give an in-depth analysis on the Carleton Ravens Women's Basketball team and hopefully give some meaningful insights and possible suggestions that can help benefit the team.

We will start with descriptive statistics based on the OUA's Team Statistics
http://www.oua.ca/sports/wbkb/2018-19/teams?sort=&r=0&pos=off

Offensive Statistics

Below we have the Offensive statistics for all teams sorted from highest to lowest average points.

OUA Offensive Statistics

RK	NAME	GP	FG	PCT	3PT	PCT	FT	PCT	OFF	DEF	REB	AST	TO	STL	BLK	PF	PTS
1	Ottawa	16	491-1090	45.0	105-296	35.5	186-239	77.8	13.9	28.5	42.4	17.3	14.9	10.1	4.1	16.0	79.6
2	McMaster	16	453-1141	39.7	127-390	32.6	198-267	74.2	15.1	27.6	42.7	20.0	15.7	11.8	4.4	16.8	76.9
3	Ryerson	16	441-1067	41.3	95-307	30.9	227-317	71.6	17.6	29.7	47.3	15.5	16.4	9.5	3.8	14.9	75.3
4	Lakehead	16	452-1097	41.2	96-309	31.1	167-243	68.7	13.3	23.4	36.6	14.8	15.6	12.0	2.8	17.7	72.9
5	Guelph	16	404-1116	36.2	67-252	26.6	229-322	71.1	15.8	24.0	39.8	11.1	19.9	11.4	3.6	16.5	69.0
6	Queen's	16	391-1052	37.2	100-339	29.5	215-323	66.6	16.0	28.8	44.8	15.4	20.6	9.9	3.3	13.3	68.6
7	Windsor	16	404-1070	37.8	104-366	28.4	184-266	69.2	14.4	26.2	40.6	14.1	16.9	7.8	2.7	16.8	68.5
8	Carleton	16	388-1014	38.3	120-408	29.4	174-252	69.0	13.1	24.5	37.6	12.9	16.4	9.5	3.6	15.0	66.9
9	York	16	381-1061	35.9	105-364	28.8	200-317	63.1	15.1	24.5	39.6	10.9	20.9	11.1	2.2	19.6	66.7
10	Brock	16	380-1104	34.4	88-368	23.9	165-260	63.5	14.4	23.4	37.8	11.4	14.9	11.4	1.1	17.9	63.3
11	Laurentian	16	329-950	34.6	126-415	30.4	221-302	73.2	8.5	27.5	36.0	12.9	16.7	8.6	2.4	16.7	62.8
12	Toronto	16	350-1035	33.8	90-338	26.6	195-273	71.4	12.6	25.2	37.8	10.6	16.8	8.6	1.9	16.8	61.6
13	Laurier	16	348-973	35.8	56-236	23.7	211-288	73.3	8.5	28.0	36.5	14.5	17.6	6.6	4.0	15.9	60.2
14	Nipissing	16	332-1084	30.6	87-385	22.6	134-204	65.7	11.0	24.2	35.2	10.9	14.1	6.8	1.3	15.3	55.3
15	Algoma	16	300-908	33.0	105-393	26.7	171-275	62.2	8.5	24.5	33.0	9.8	20.5	7.9	2.6	18.9	54.9
16	Western	16	300-874	34.3	94-320	29.4	174-265	65.7	8.7	21.2	29.9	7.4	19.6	8.8	1.1	13.6	53.9
17	Waterloo	16	284-988	28.7	73-339	21.5	211-315	67.0	11.3	23.9	35.1	9.6	19.9	8.8	2.1	18.1	53.3

Figure 2: Women's OUA Offensive Statistics.

Surprisingly Carleton is placed 8th out of all the teams when ranked offensively based on Average Team PPG. Yet, Carleton is still one of the top 4 teams in Women's U Sports. This is because basketball is a two-way game. For what Carleton lacks on offense, they make up for it on defense. However, the top four teams in this table consist of top 2 teams for the East and the top 2 teams in the West. We can also see that those teams have the best shooting percentages, which of course makes sense. The best offensive teams are the ones that shoot the most effectively and thus score more points than the average team. If we sort best to worst for each variable, we won't always get the top teams in the league.

Below is a table of the top 5 teams for each statistic.

Top 5 charts per Offensive Statistic

RANK	NAME	FG	FG%	RANK	NAME	3PT	3PT%	RANK	NAME	FT	FT%	RANK	NAME	PTS
1	Ottawa	491-1090	45	1	Ottawa	105-296	35.5	1	Ottawa	186-239	77.8	1	Ottawa	79.6
2	Ryerson	441-1067	41.3	2	McMaster	127-390	32.6	2	McMaster	198-267	74.2	2	McMaster	76.9
3	Lakehead	452-1097	41.2	3	Lakehead	96-309	31.1	3	Laurier	211-288	73.3	3	Ryerson	75.3
4	McMaster	453-1141	39.7	4	Ryerson	95-307	30.9	4	Laurentian	221-302	73.2	4	Lakehead	72.9
5	Carleton	388-1014	38.3	5	Laurentian	126-415	30.4	5	Ryerson	227-317	71.6	5	Guelph	69

RANK	NAME	OFF	RANK	NAME	DEF	RANK	NAME	REB	RANK	NAME	AST
1	Ryerson	17.6	1	Ryerson	29.7	1	Ryerson	47.3	1	McMaster	20
2	Queen's	16	2	Queen's	28.8	2	Queen's	44.8	2	Ottawa	17.3
3	Guelph	15.8	3	Ottawa	28.5	3	McMaster	42.7	3	Ryerson	15.5
4	McMaster	15.1	4	Laurier	28	4	Ottawa	42.4	4	Queen's	15.4
5	York	15.1	5	McMaster	27.6	5	Windsor	40.6	5	Lakehead	14.8

RANK	NAME	TO	RANK	NAME	STL	RANK	NAME	BLK	RANK	NAME	PF
1	Nipissing	14.1	1	Lakehead	12	1	McMaster	4.4	1	Queen's	13.3
2	Brock	14.9	2	McMaster	11.8	2	Ottawa	4.1	2	Western	13.6
2	Ottawa	14.9	3	Brock	11.4	3	Laurier	4	3	Ryerson	14.9
4	Lakehead	15.6	4	Guelph	11.4	4	Ryerson	3.8	4	Carleton	15
5	McMaster	15.7	5	York	11.1	5	Guelph	3.6	5	Nipissing	15.3

Figure 3: 12 Tables of Women's OUA Offensive Statistics per Stat.

We are interested in which variables contribute the most to winning games. If we could do that then we can look at which of those important variables our team lacks and put more emphasis to improving them.

To find the most important variables we can calculate correlation statistics and see which of them are the most correlated to a high win ratio.

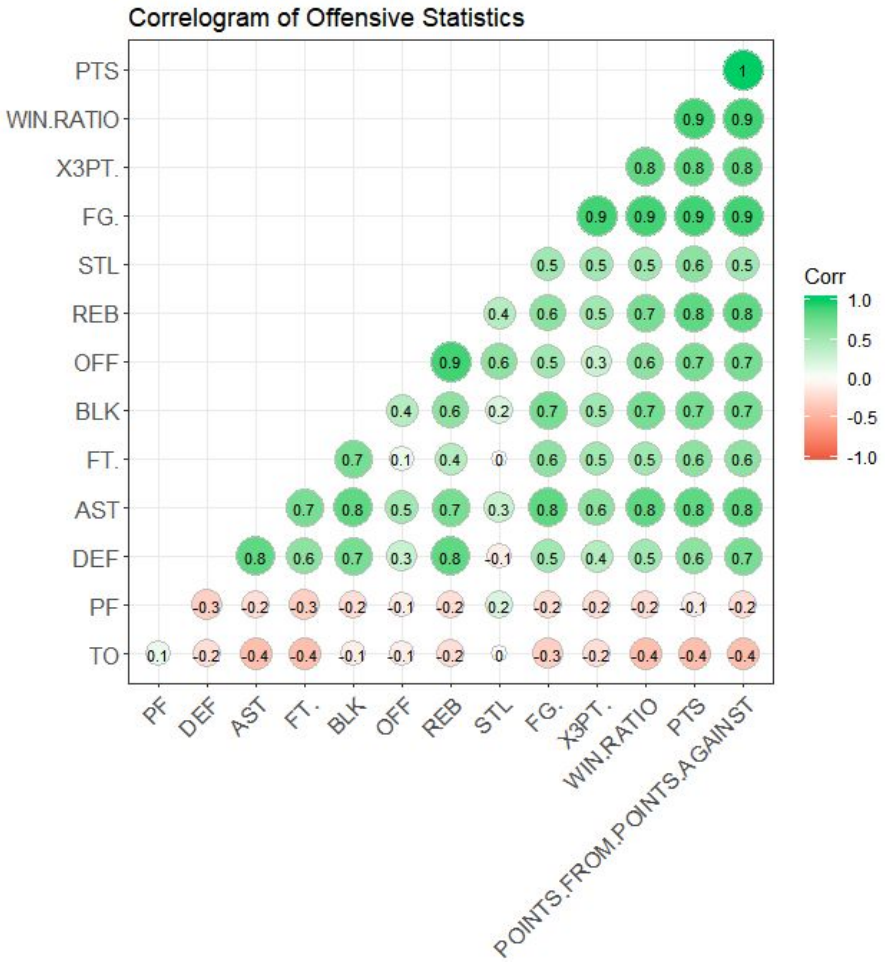

Figure 4: Correlogram of Offensive Statistics rounded to the nearest tenth. The variables are the following: PTS = Points per game, Win Ratio = Wins/Total Games, X3PT = 3PT Field Goal %, FG = Field-Goal %, STL = Steals per game, REB = Rebounds per game, OFF = Offensive Rebounds per game, BLK = Blocks per game, FT = Free throw %, AST = Assists per game, DEF = Defensive Rebounds per game, PF = Personal Fouls per game, TO = Turnovers per game.

This is a correlogram. A correlogram shows the correlation between two variables by looking at the intersection of the variables. We can see that Personal Fouls and Turnovers are negatively correlated to all the other statistics.

Looking at the Win Ratio variable, we see that the most correlated statistics are FG%, 3PT%,, Assists, Blocks, and Rebounds, respectively from highest to lowest, with a correlation statistic of > 0.7.

These are team statistics that differ between all teams. How a team plays together greatly impacts these statistics. Each team is comprised of unique players that have their own pros and cons while on the court. The coach's job is to create lineups of 5 players that will optimize the team's performance.

Each team has their own playing style and adjusts to the opponent's playing style and/or makes the opponent adjust to their playing style.

Team Play Types

Using Synergy Sports Technology (https://www.synergysportstech.com), an American company that creates web-based, on-demand video-supported basketball analytics for the purposes of scouting, development and entertainment, we could see each team's playing style ordered from most to least used.

Play Types of Women's Carleton Ravens Regular Season

Play Types	% Time	Poss	Points	PPP	Rank	Rating	FGm	FGM	FGA	FG%	aFG%	%TO	%FT	%SF	%Score
Spot Up	30.8%	407	344	0.845	89%	Excellent	228	122	350	34.9%	45.4%	10.6%	4.7%	3.9%	33.2%
Transition	15.1%	199	165	0.829	52%	Good	85	60	145	41.4%	47.9%	19.1%	9.5%	6.5%	38.2%
P&R Ball Handler	9.8%	130	87	0.669	76%	Very Good	57	33	90	36.7%	38.9%	21.5%	9.2%	6.2%	34.6%
Cut	8.7%	115	114	0.991	72%	Very Good	42	42	84	50%	50%	10.4%	21.7%	20%	50.4%
Post-Up	7.7%	102	81	0.794	71%	Very Good	42	27	69	39.1%	39.1%	14.7%	19.6%	16.7%	43.1%
Isolation	6%	79	56	0.709	63%	Good	38	23	61	37.7%	41%	17.7%	7.6%	6.3%	34.2%
Off Screen	4.5%	60	43	0.717	48%	Average	36	16	52	30.8%	39.4%	11.7%	1.7%	1.7%	28.3%
Offensive Rebounds (put backs)	4.5%	59	39	0.661	11%	Poor	22	17	39	43.6%	43.6%	23.7%	16.9%	16.9%	35.6%
P&R Roll Man	2.8%	37	29	0.784	49%	Average	17	12	29	41.4%	46.6%	16.2%	5.4%	5.4%	35.1%
Hand Off	1.7%	23	18	0.783	76%	Very Good	13	7	20	35%	35%	4.3%	13%	13%	39.1%
Miscellaneous	8.3%	109	17	0.156	2%	Poor	12	1	13	7.7%	11.5%	77.1%	11%	0%	10.1%

Figure 5: Offensive Play Types of the Women's Carleton Ravens team ordered by most to least used.

These are Carleton's play types. Carleton's top five most used play types are Spot-Ups, Transitions, Pick and Roll Ball Handler (when the Pick and Roll ball handler ends up taking the shot, not the Roll man), Cut and Post-Up. Also provided on Synergy are the results of the plays and related statistics with ratings for each play type based on percentile of all other teams.

The play types that contributed to the most points for the Carleton Ravens Women's Basketball team are Spot-Ups, Transition and Cuts, in which we are rated Excellent, Good, and Very Good, respectively (the criteria used for the ratings are the Points Per Possession ranked against the rest of the teams in the league based on a percentile scale). Using this table we can see which play types are the most effective and which are not.
The %Score variable is the percentage of the player's possessions where they scored at least 1 point. The following is the formula:
%Score = (Total Possessions with >= 1 Point) / (Total Possessions)
This metric is very useful in finding which of the plays leads to the most efficient scoring. We can see that Cuts, and Post-Ups are very effective. The %FT and %SF are also important to note when speaking about scoring efficiency because they show the percentage of possessions

where the player is fouled in the act of shooting and awarded free throws. These metrics are also highest for Cuts and Post-Ups.
We should also take a look at the %TO variable. This variable tells us the percentage of possessions where the player turns the ball over. The top 3 highest turnover percentages are Offensive Put-Backs, Pick and Roll Ball Handler, and Transition. This could suggest some practice on conducting these plays.

We could compare Carleton's playing type to the other top teams. This could possibly give insight into possible traits of successful teams and their playing styles.

uOttawa's Play Types:

Play Types	% Time	Poss	Points	PPP	Rank	Rating	FGm	FGM	FGA	FG%	aFG%	%TO	%FT	%SF	%Score
Transition	23.4%	327	335	1.024	100%	Excellent	106	126	232	54.3%	60.8%	19%	11.9%	10.7%	47.4%
Spot Up	22.5%	315	242	0.768	65%	Very Good	194	91	285	31.9%	40.9%	7.9%	1.6%	1.3%	30.5%
Post-Up	12.2%	170	141	0.829	78%	Very Good	70	61	131	46.6%	46.6%	15.9%	8.2%	5.3%	41.8%
Cut	9.9%	139	152	1.094	98%	Excellent	44	64	108	59.3%	59.3%	12.9%	10.8%	10.1%	55.4%
P&R Ball Handler	7.2%	101	87	0.861	100%	Excellent	49	34	83	41%	45.2%	10.9%	8.9%	6.9%	40.6%
Offensive Rebounds (put backs)	6.7%	93	93	1	76%	Very Good	32	36	68	52.9%	52.9%	12.9%	17.2%	16.1%	52.7%
Off Screen	4.1%	58	37	0.638	26%	Below Average	33	14	47	29.8%	35.1%	13.8%	5.2%	3.4%	29.3%
Hand Off	2.7%	38	38	1	98%	Excellent	17	14	31	45.2%	51.6%	7.9%	10.5%	7.9%	47.4%
P&R Roll Man	2.4%	34	25	0.735	47%	Average	20	11	31	35.5%	37.1%	5.9%	2.9%	2.9%	35.3%
Isolation	1.4%	20	13	0.65	37%	Average	10	4	14	28.6%	28.6%	20%	15%	15%	30%
Miscellaneous	7.4%	103	29	0.282	61%	Good	9	6	15	40%	40%	75.7%	9.7%	0%	15.5%

Ryerson's Play Types:

Play Types	% Time	Poss	Points	PPP	Rank	Rating	FGm	FGM	FGA	FG%	aFG%	%TO	%FT	%SF	%Score
Spot Up	20.3%	286	227	0.794	74%	Very Good	179	82	261	31.4%	41.8%	5.9%	3.1%	2.8%	31.5%
Post-Up	14.8%	208	176	0.846	80%	Very Good	82	67	149	45%	45%	15.4%	14.9%	11.5%	44.2%
Transition	12.9%	182	164	0.901	78%	Very Good	69	63	132	47.7%	53.8%	20.3%	10.4%	9.3%	41.2%
Cut	10.8%	152	157	1.033	78%	Very Good	57	65	122	53.3%	53.3%	9.2%	12.5%	12.5%	53.3%
Offensive Rebounds (put backs)	10.8%	152	161	1.059	93%	Excellent	50	60	110	54.5%	54.5%	11.2%	21.1%	20.4%	55.3%
P&R Ball Handler	8.5%	119	96	0.807	98%	Excellent	54	36	90	40%	43.3%	16%	12.6%	10.1%	37.8%
Off Screen	4.8%	67	45	0.672	33%	Average	37	14	51	27.5%	34.3%	14.9%	9%	9%	29.9%
Isolation	3.3%	47	28	0.596	26%	Below Average	22	5	27	18.5%	20.4%	23.4%	19.1%	17%	29.8%
P&R Roll Man	2.5%	35	18	0.514	7%	Poor	20	8	28	28.6%	28.6%	11.4%	8.6%	8.6%	28.6%
Hand Off	2.1%	29	20	0.69	53%	Good	18	7	25	28%	36%	10.3%	6.9%	6.9%	27.6%
Miscellaneous	9.2%	129	31	0.24	35%	Average	11	4	15	26.7%	26.7%	76%	12.4%	3.1%	14%

McMaster's Play Types:

Play Types	% Time	Poss	Points	PPP	Rank	Rating	FGm	FGM	FGA	FG%	aFG%	%TO	%FT	%SF	%Score
Spot Up	23.5%	363	325	0.895	98%	Excellent	211	117	328	35.7%	46.5%	5.8%	4.4%	4.1%	35.5%
Transition	23.4%	362	316	0.873	67%	Very Good	142	117	259	45.2%	51%	19.6%	10.5%	9.1%	41.2%
Cut	8.7%	134	140	1.045	87%	Excellent	51	63	114	55.3%	55.3%	6%	9.7%	9%	53.7%
Off Screen	6.5%	101	69	0.683	39%	Average	67	25	92	27.2%	32.1%	5%	6.9%	6.9%	28.7%
P&R Ball Handler	6.1%	95	55	0.579	35%	Average	55	21	76	27.6%	29.6%	11.6%	8.4%	5.3%	28.4%
Offensive Rebounds (put backs)	6.1%	94	75	0.798	28%	Below Average	39	28	67	41.8%	41.8%	16%	12.8%	10.6%	41.5%
Hand Off	5.6%	86	72	0.837	89%	Excellent	45	27	72	37.5%	45.8%	11.6%	4.7%	4.7%	36%
Post-Up	4.9%	76	49	0.645	35%	Average	38	16	54	29.6%	29.6%	14.5%	14.5%	13.2%	34.2%
Isolation	2.5%	38	25	0.658	39%	Average	22	8	30	26.7%	26.7%	7.9%	13.2%	10.5%	34.2%
P&R Roll Man	2.3%	35	34	0.971	80%	Very Good	12	14	26	53.8%	55.8%	17.1%	8.6%	2.9%	48.6%
Miscellaneous	10.4%	161	64	0.398	96%	Excellent	19	14	33	42.4%	43.9%	67.1%	12.4%	0.6%	20.5%

Figure 6: The Play Types of uOttawa, Ryerson and McMaster ordered by most to least used.

Defensive Statistics

Below we have Team Defensive Statistics ordered from lowest to highest points allowed.

OUA Defensive Statistics

RK	NAME	GP	FG	PCT	3PT	PCT	OFF	DEF	REB	MRGN	AST	TO	STL	BLK	PF	PTS
1	Carleton	16	324-926	35.0	70-295	23.7	8.7	22.3	30.9	6.7	10.9	19.1	8.6	2.4	16.9	54.3
2	Ryerson	16	318-967	32.9	100-336	29.8	10.8	22.4	33.3	14.1	11.9	18.7	7.9	1.5	17.4	55.1
3	Ottawa	16	324-977	33.2	97-355	27.3	10.4	22.6	33.0	9.4	11.4	18.7	7.7	2.5	14.7	57.2
4	Queen's	16	386-1082	35.7	80-313	25.6	12.0	22.4	34.4	10.3	13.9	17.7	12.3	4.1	16.5	61.6
5	McMaster	16	367-1078	34.0	85-327	26.0	15.5	27.5	43.0	-0.3	12.8	20.9	9.2	2.5	16.8	61.8
6	Windsor	16	369-1019	36.2	76-272	27.9	10.3	22.6	32.9	7.8	10.9	15.7	8.1	1.5	16.9	62.6
7	Lakehead	16	363-1017	35.7	100-372	26.9	12.4	22.2	34.6	2.1	11.8	18.6	7.3	3.1	15.2	64.8
8	Laurentian	16	390-1046	37.3	87-318	27.4	14.0	30.1	44.1	-8.1	13.9	15.9	8.8	3.4	16.8	66.6
9	Waterloo	16	379-1041	36.4	101-371	27.2	13.6	27.3	40.9	-5.8	12.9	17.2	9.6	3.8	17.8	66.9
10	Laurier	16	383-1084	35.3	91-344	26.5	13.3	27.0	40.3	-3.8	14.9	14.0	10.0	2.5	17.6	67.4
11	Brock	16	385-1020	37.7	102-377	27.1	14.9	29.3	44.2	-6.4	15.7	18.7	8.3	2.6	16.1	67.5
12	York	16	402-1022	39.3	89-294	30.3	12.3	24.3	36.6	3.0	12.7	20.0	11.6	1.6	18.6	69.4
13	Western	16	407-1018	40.0	131-375	34.9	12.4	24.6	37.1	-7.2	10.9	15.9	10.9	2.2	15.3	69.8
14	Algoma	16	385-1043	36.9	92-344	26.7	12.9	26.7	39.6	-6.6	11.3	16.0	12.2	3.1	16.1	69.9
15	Toronto	16	411-1078	38.1	98-364	26.9	15.5	29.4	44.9	-7.1	13.4	17.1	9.3	3.6	16.1	70.9
16	Nipissing	16	422-1124	37.5	124-377	32.9	14.4	30.1	44.4	-9.3	14.8	13.4	8.1	2.9	12.9	71.8
17	Guelph	16	413-1082	38.2	115-391	29.4	14.6	24.1	38.8	1.1	15.3	19.8	10.9	3.8	18.3	72.1
18	TBD	-	0-0	-	0-0	-	-	-	-	-	-	-	-	-	-	-

Figure 7: OUA Women's Basketball Defensive Statistics ordered from lowest to highest points allowed.

Here we see that Carleton is the best defensive team in the league, allowing the opponent's an average of 54.3 PPG. Teams shoot an average FG of 35% when playing against us, along with the best defense against 3-pointers with teams shooting an average 3PT of 23.7%.

We can perform the same correlogram to see which defensive variables are most important to a successful team.

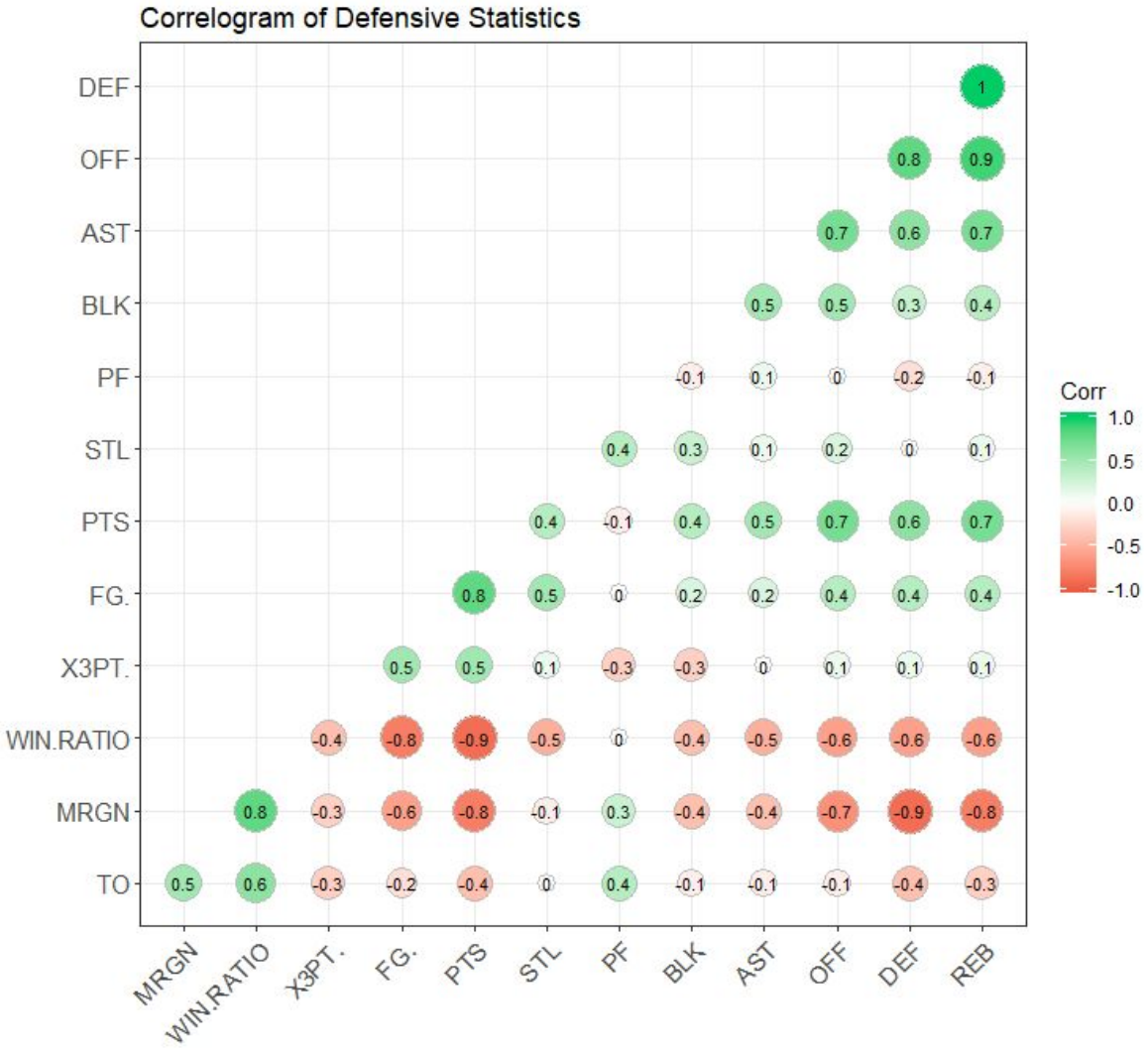

Figure 8: Correlogram of Defensive Statistics rounded to the nearest tenth.

This time since we are looking at defensive statistics,we are looking at the inverse of the Offensive Correlogram. This means that teams that force the most Turnovers, and Personal Fouls and teams that make the opposing team score less, have less FG%, assists, steals and blocks are the more successful defensive team.

RANK	NAME	FG	PCT
1	Ryerson	318-967	32.9
2	Ottawa	324-977	33.2
3	McMaster	367-1078	34
4	Carleton	324-926	35
5	Laurier	383-1084	35.3

RANK	NAME	3PT	PCT
1	Carleton	70-295	23.7
2	Queen's	80-313	25.6
3	McMaster	85-327	26
4	Laurier	91-344	26.5
5	Algoma	92-344	26.7

RK	NAME	OFF
1	Carleton	8.7
2	Windsor	10.3
3	Ottawa	10.4
4	Ryerson	10.8
5	Queen's	12

RANK	NAME	PTS
1	Carleton	54.3
2	Ryerson	55.1
3	Ottawa	57.2
4	Queen's	61.6
5	McMaster	61.8

RANK	NAME	DEF
1	Lakehead	22.2
2	Carleton	22.3
3	Queen's	22.4
3	Ryerson	22.4
5	Windsor	22.6

RANK	NAME	REB
1	Carleton	30.9
2	Windsor	32.9
3	Ottawa	33
4	Ryerson	33.3
5	Queen's	34.4

RANK	NAME	MRGN
1	Ryerson	14.1
2	Queen's	10.3
3	Ottawa	9.4
4	Windsor	7.8
5	Carleton	6.7

RANK	NAME	AST
1	Carleton	10.9
1	Western	10.9
3	Windsor	10.9
4	Algoma	11.3
5	Ottawa	11.4

RANK	NAME	TO
1	McMaster	20.9
2	York	20
3	Guelph	19.8
4	Carleton	19.1
5	Brock	18.7

RANK	NAME	STL
1	Lakehead	7.3
2	Ottawa	7.7
3	Ryerson	7.9
4	Windsor	8.1
5	Nipissing	8.1

RANK	NAME	BLK
1	Ryerson	1.5
1	Windsor	1.5
3	York	1.6
4	Western	2.2
5	Carleton	2.4

RANK	NAME	PF
1	York	18.6
2	Guelph	18.3
3	Waterloo	17.8
4	Laurier	17.6
5	Ryerson	17.4

Figure 9: 12 Tables of Women's OUA Offensive Statistics per Stat.

These are the top 5 defensive teams for every category.

Exploring Synergy Features

As previously mentioned, Synergy Sports Technology is an American company that creates web-based, on-demand video-supported basketball analytics for the purposes of scouting, development and entertainment. There are many analytical tools we can use on this platform. I will be demonstrating the important ones.

Multi-Game Shot Chart

The multi-game shot chart is an extremely useful feature that shows the accumulation of all shots taken by a team on a shot chart with their associated frequencies.
Here is an example using Carleton:

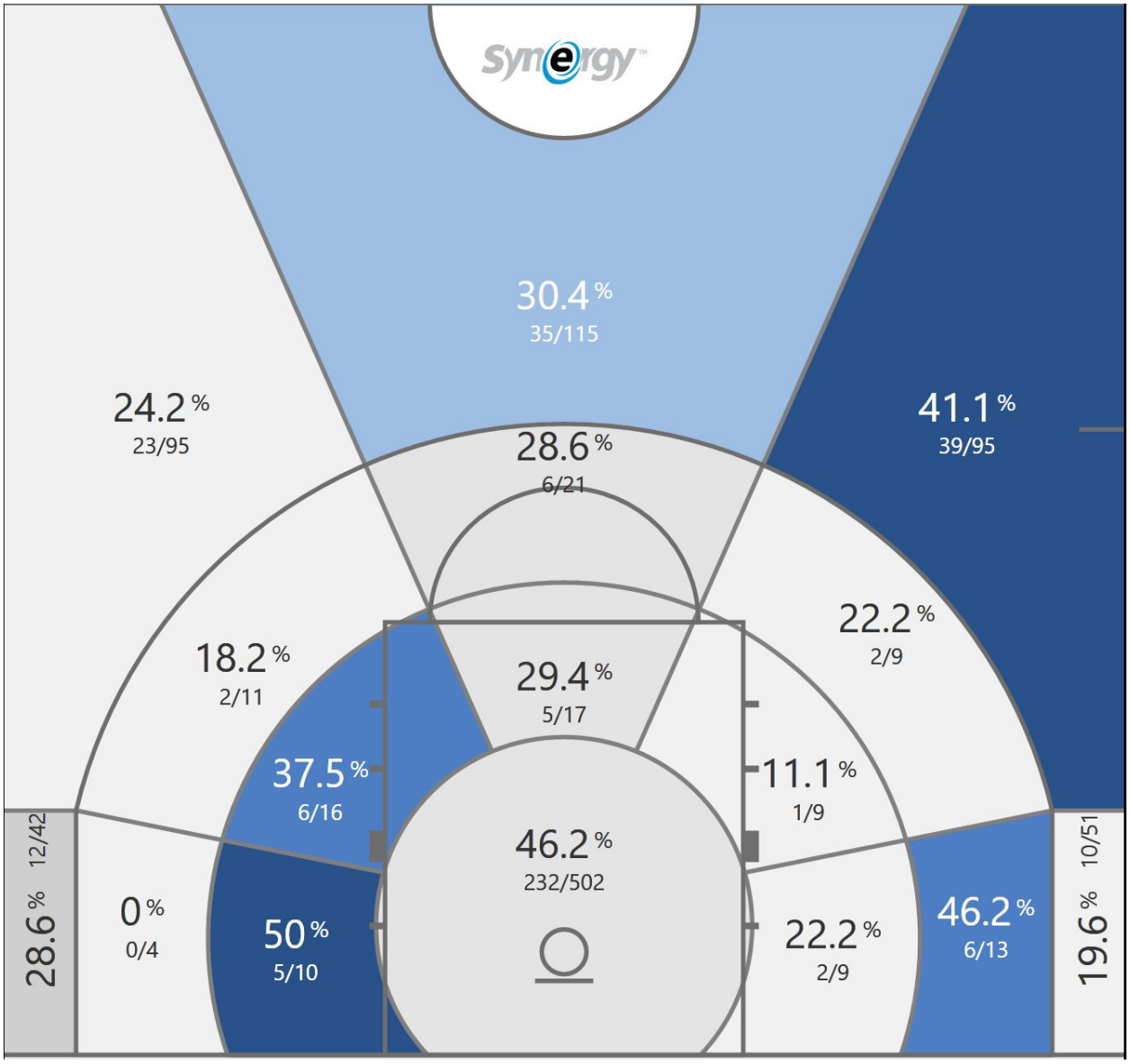

Figure 10: A shot chart of the Carleton Ravens Women's team showing a the Field-Goals Made over the Field-Goal Attempts for every area.

This is extremely helpful because it shows us where the teams are most effective and where they shoot from the most. Also using this tool, we can filter out by player, against which team, the play type, the shot type, the game situation, assisted from and shot distance. On top of that, it allows us to select clips that we can watch to see where something went wrong (or right).

Using this we will show our most used play types that we previously mentioned.

Spot-Ups:

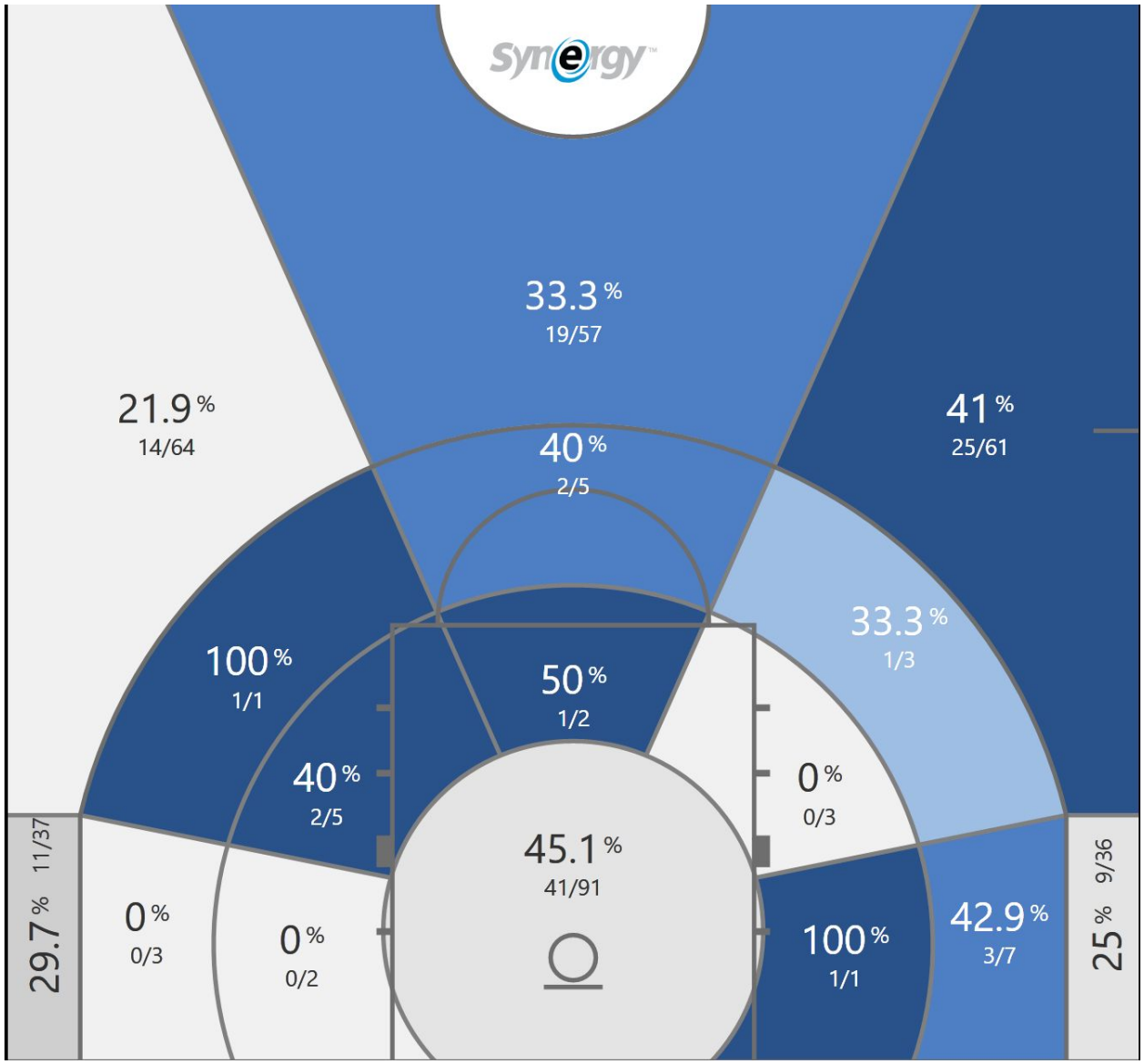

Figure 11: Shot chart filtered by Spot-Up play type for the Women's Carleton Ravens Team.

Transition:

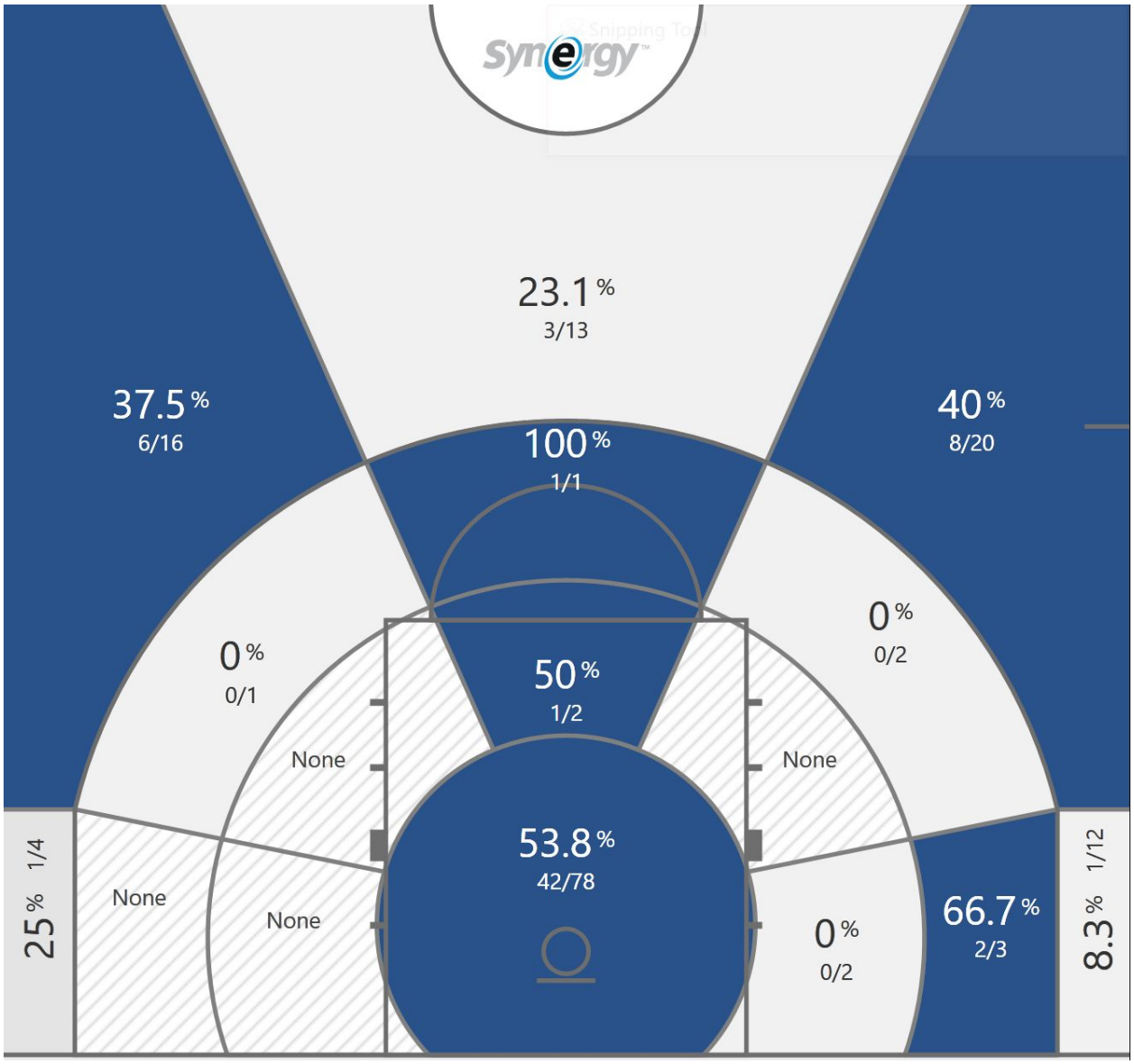

Figure 12: Shot chart filtered by the Transition play type for the Women's Carleton Ravens.

Pick & Roll Ball Handler:

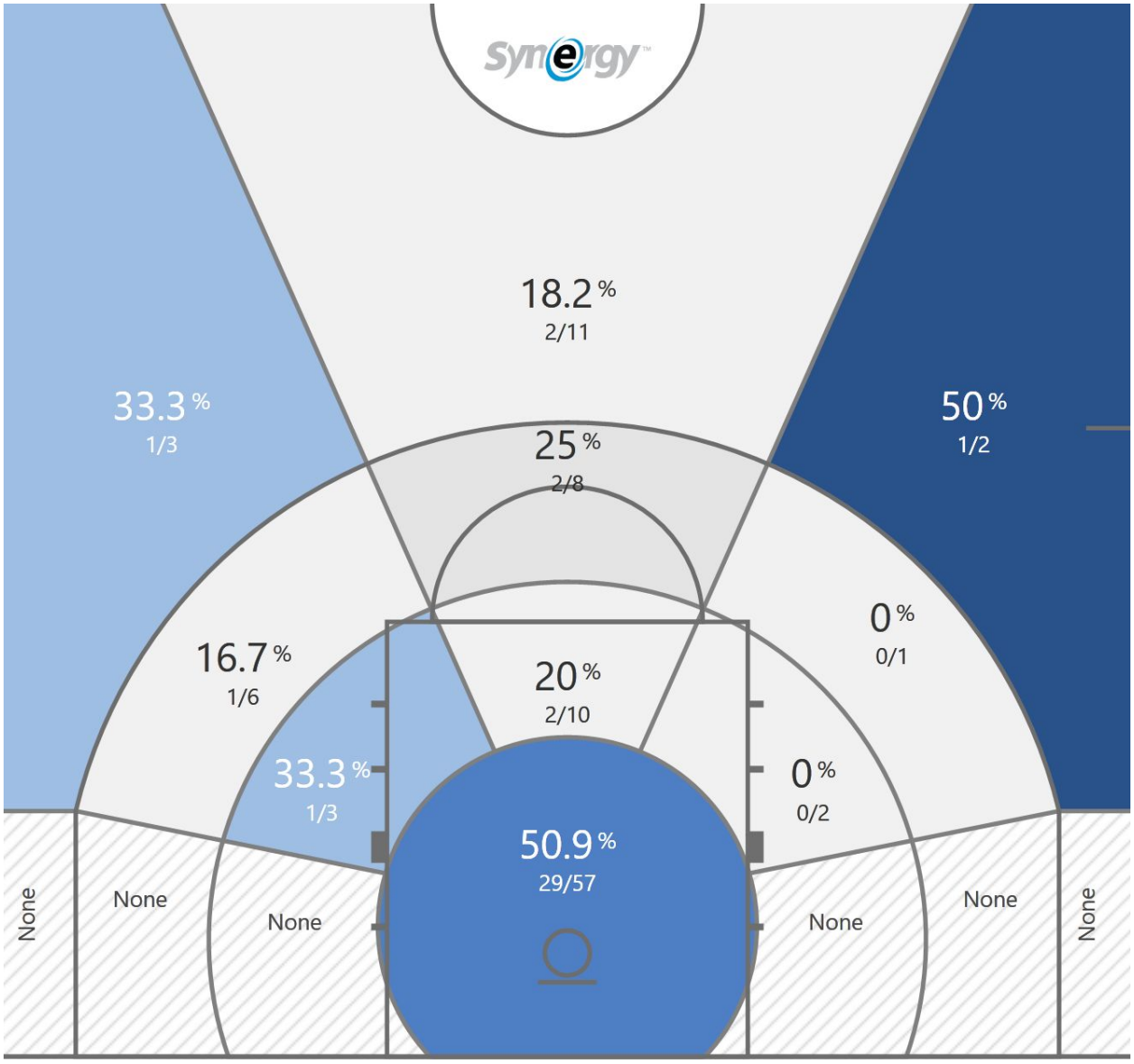

Figure 13: Shot chart filtered by the Pick & Roll Ball Handler play type for the Women's Carleton Ravens.

Cut:

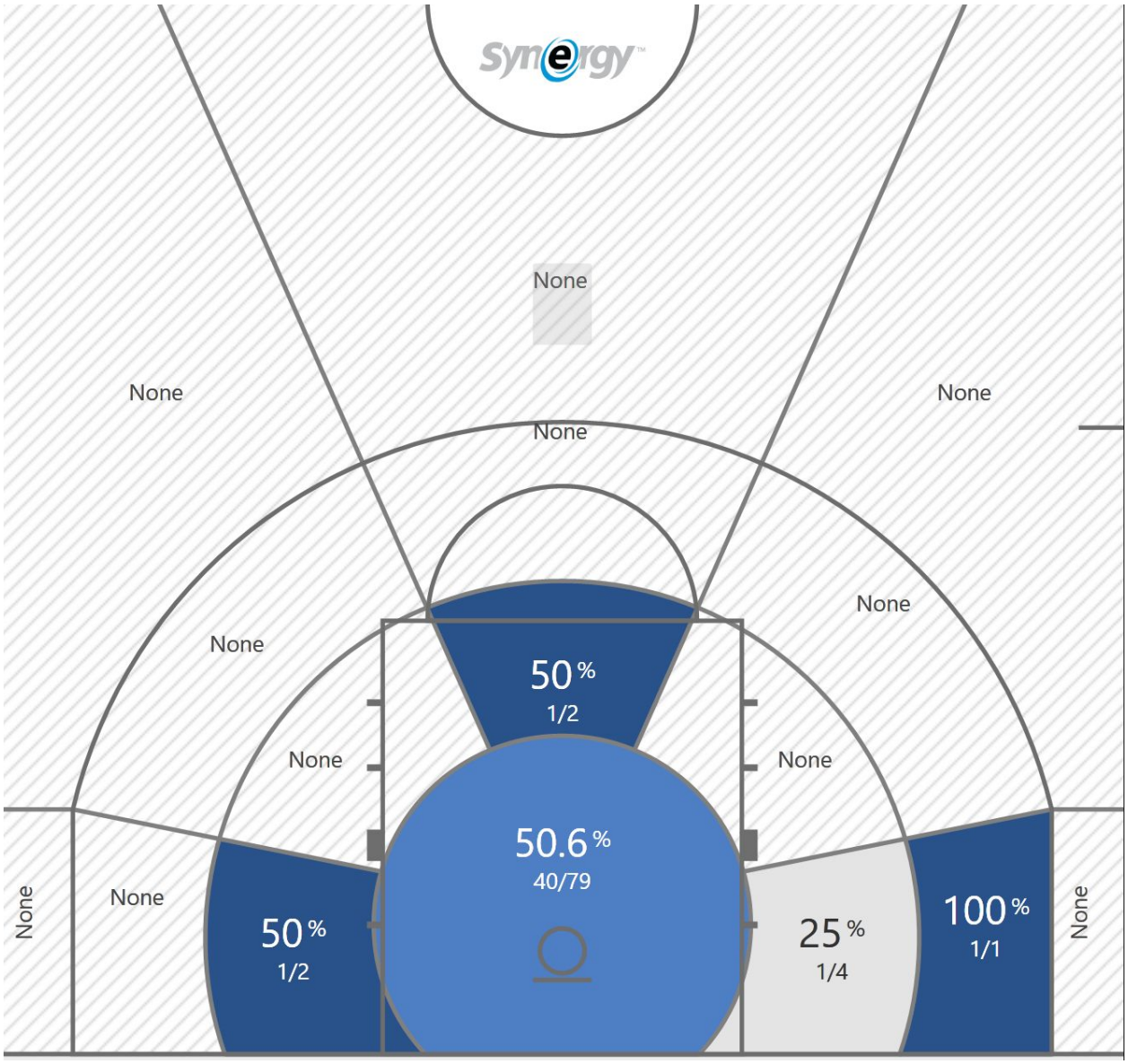

Figure 14: Shot chart filtered by the Cut play type for the Women's Carleton Ravens.

Post-Up:

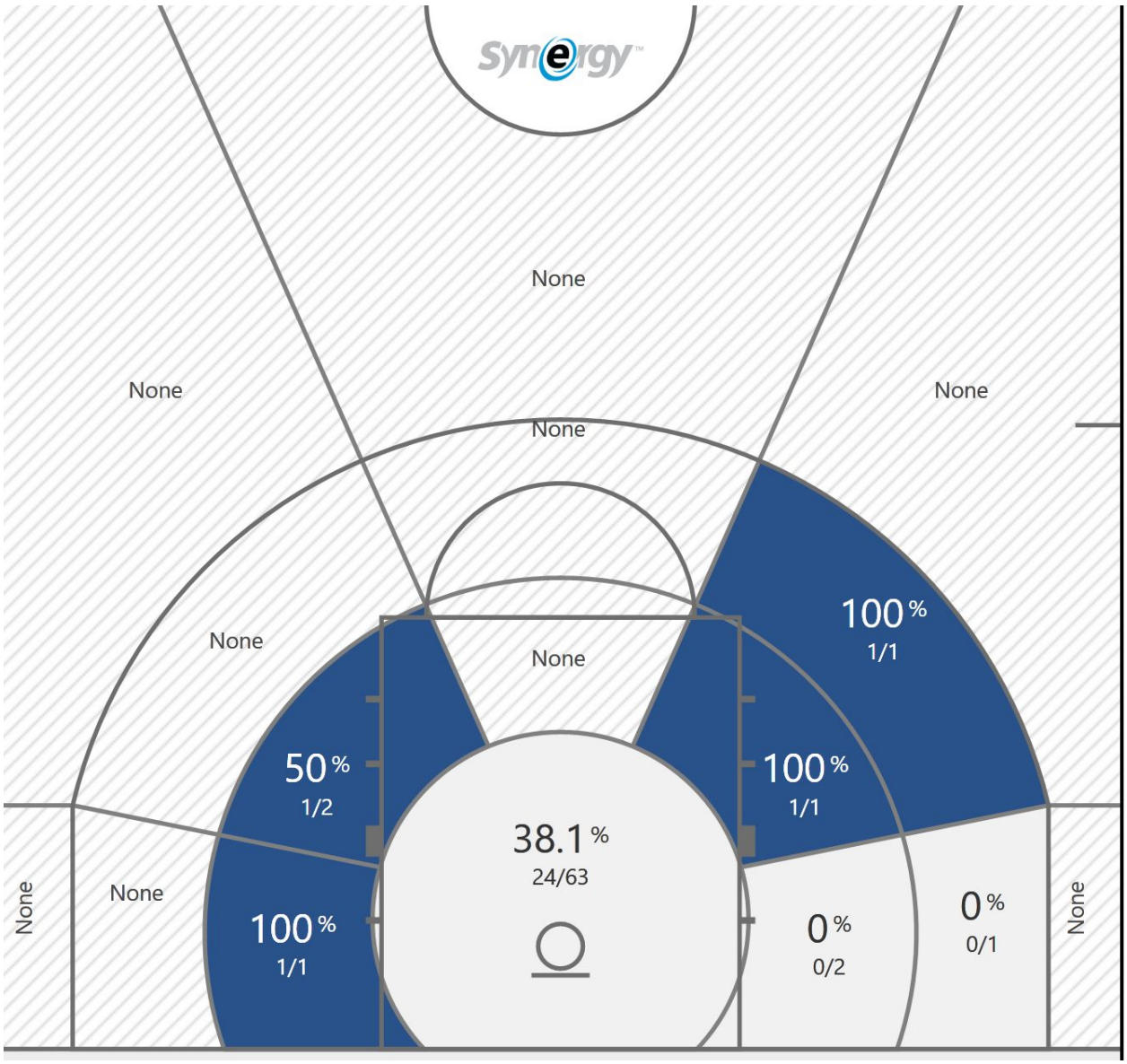

Figure 15: Shot chart filtered by the Post-Up play type for the Women's Carleton Ravens.

We can also filter by player and see which players are shooting best and where they are most efficient.
The players that shoot the most are:

#9 Madison Reid

#	Name	Points	FGm	FGM	FGA	FG%	aFG%	2FGm	2FGM	2FGA	2FG%	3FGm	3FGM	3FGA	3FG%
1	Carleton University Ravens Total	202	121	75	196	38.3	49.2	48	36	84	42.9	73	39	112	34.8
2	#9 M. Reid	202	121	75	196	38.3	49.2	48	36	84	42.9	73	39	112	34.8

Figure 16: Table of Madison Reid's (Starting PG) shot statistics.

Note: aFG% is known as adjusted Field Goal percentage. A formula designed to determine the impact of the 3 point shooting of the player's overall shooting percentage.
aFG% = [(Total Points - Free Throws Made) / FGA] / 2

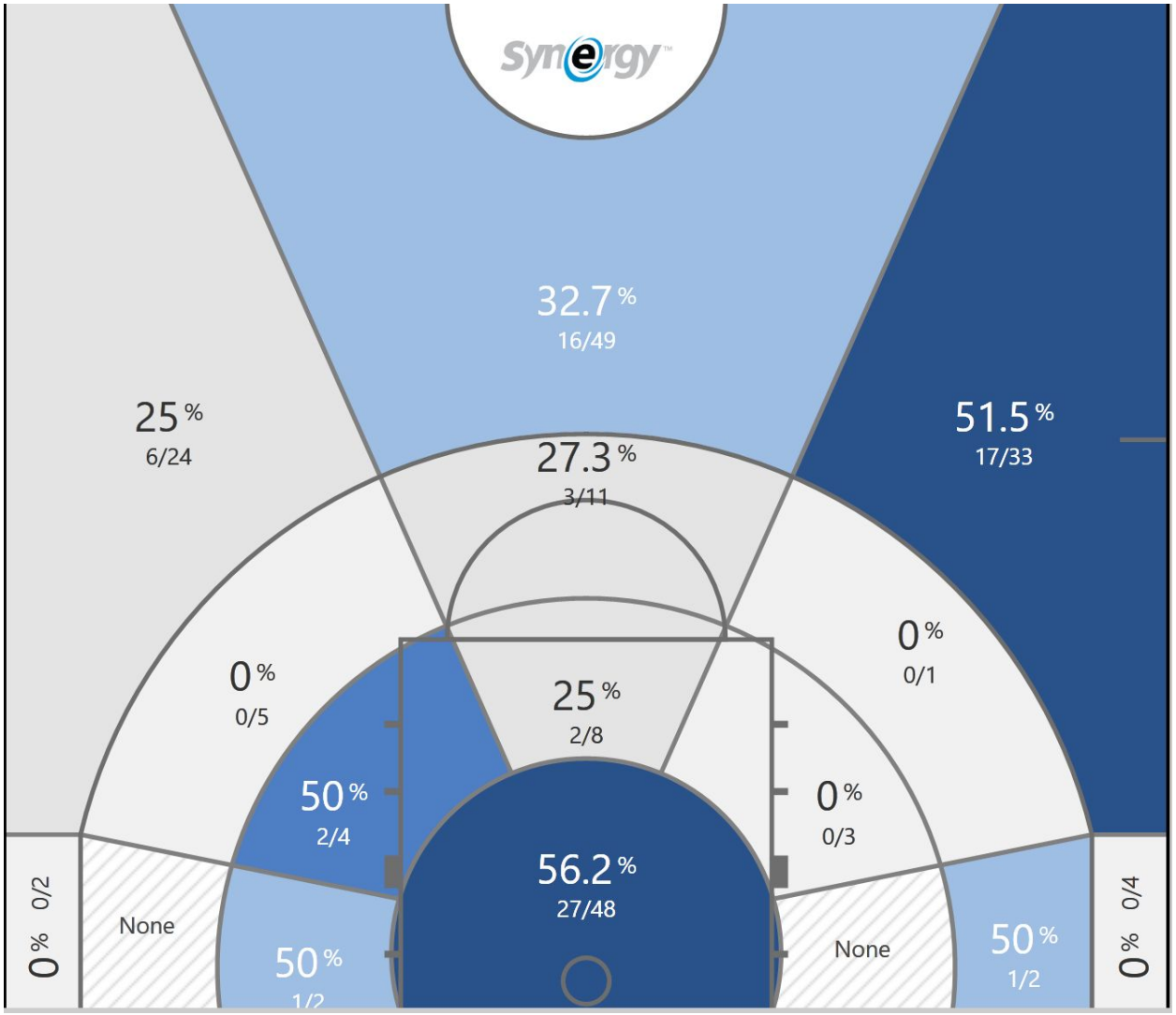

Figure 17: Madison Reid's Shot chart, showing the Field Goals Made over the Field Goal Attempts for every area.

#13 Nicole Gilmore

#	Name	Points	FGm	FGM	FGA	FG%	aFG%	2FGm	2FGM	2FGA	2FG%	3FGm	3FGM	3FGA	3FG%
1	Carleton University Ravens Total	210	118	77	195	39.5	47.4	70	55	125	44	48	22	70	31.4
2	#13 N. Gilmore	210	118	77	195	39.5	47.4	70	55	125	44	48	22	70	31.4

Figure 18: Table of Nicole Gilmore's (SF) shot statistics.

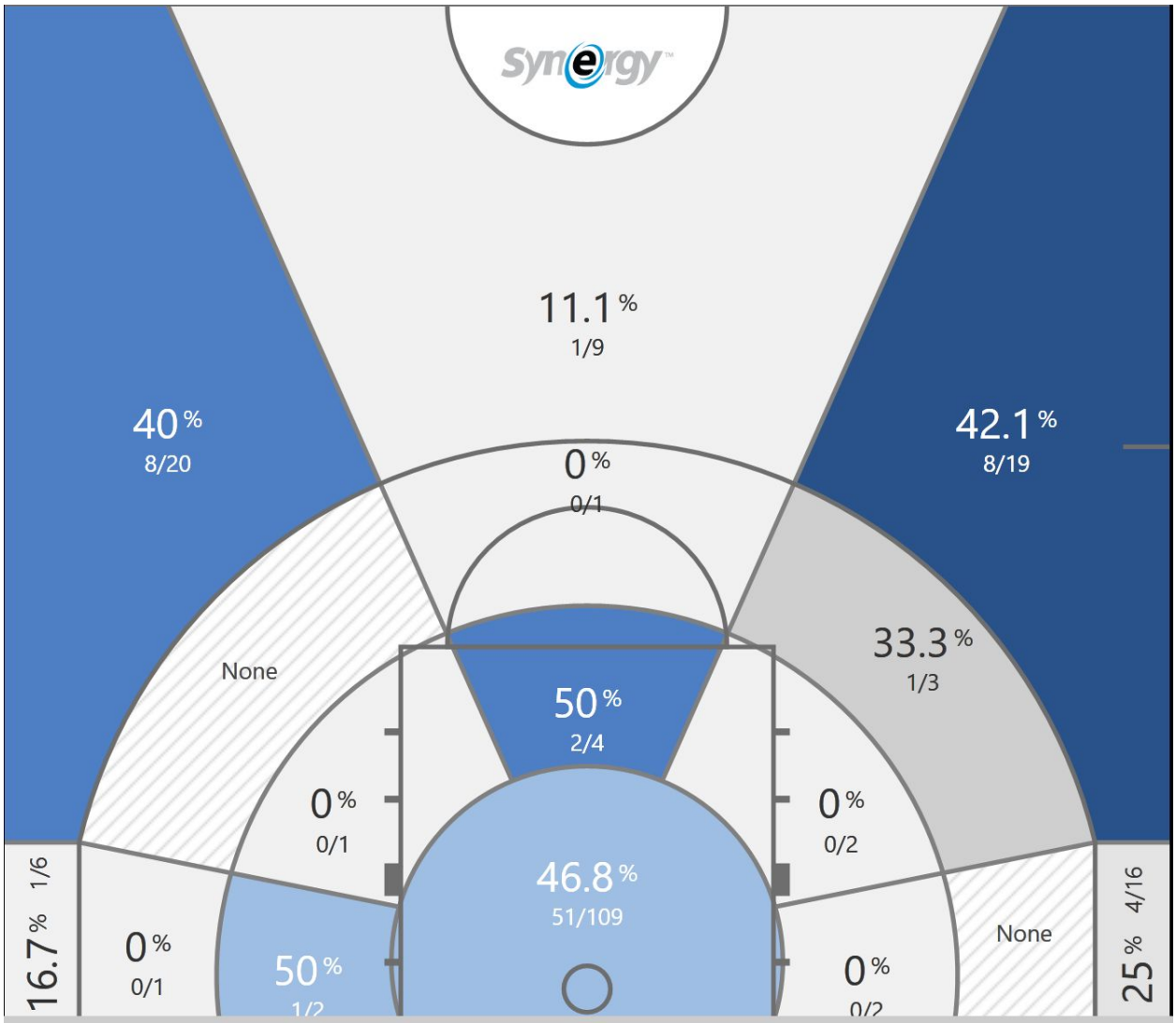

Figure 19: Nicole Gilmore's shot chart.

#8 Alyssa Cerino

#	Name	Points	FGm	FGM	FGA	FG%	aFG%	2FGm	2FGM	2FGA	2FG%	3FGm	3FGM	3FGA	3FG%
1	Carleton University Ravens Total	213	100	74	174	42.5	51.4	69	60	129	46.5	31	14	45	31.1
2	#8 A. Cerino	213	100	74	174	42.5	51.4	69	60	129	46.5	31	14	45	31.1

Figure 20: Table of Alyssa Cerino's (PF/C) shot statistics.

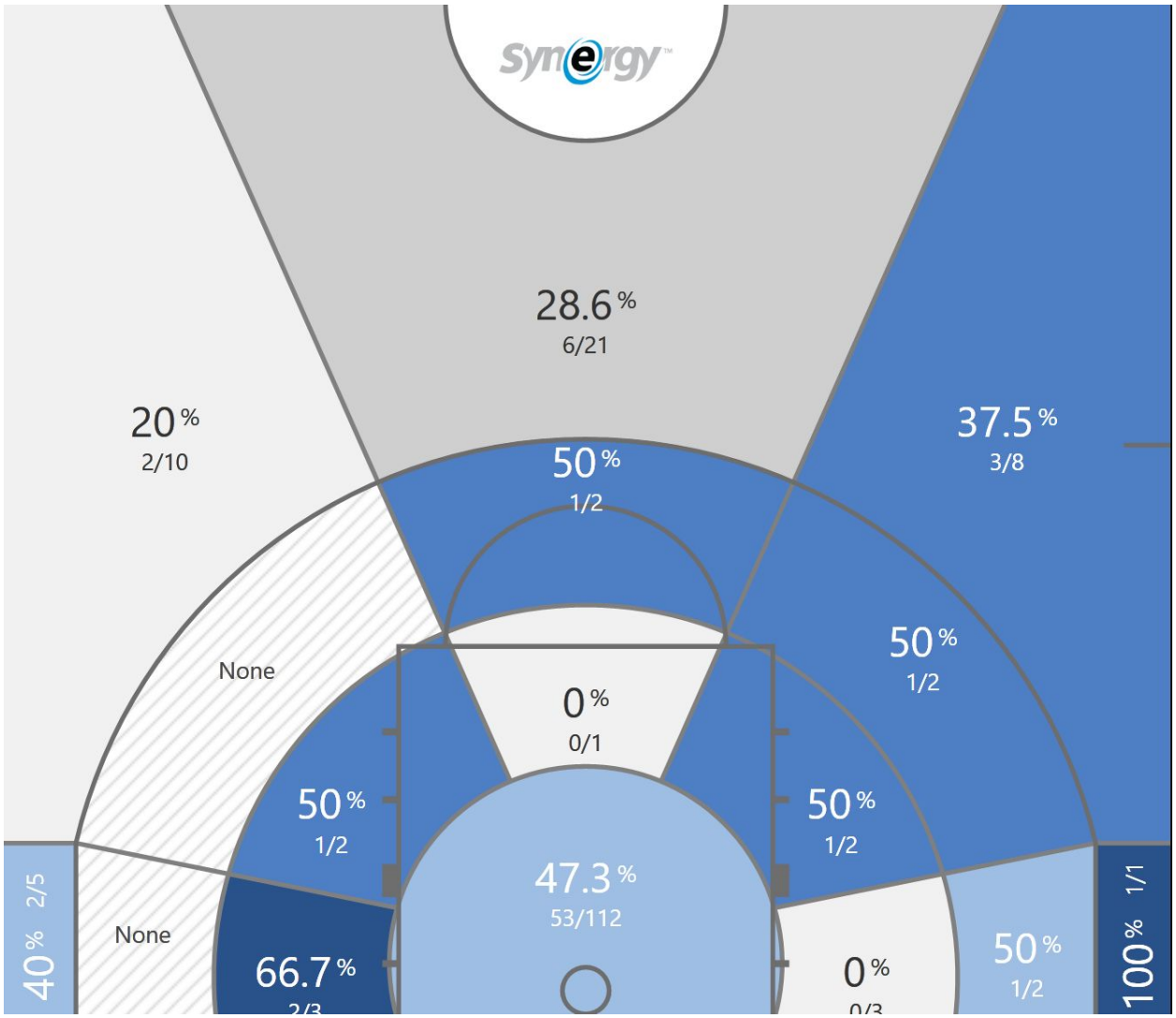

Figure 21: Alyssa Cerino's shot chart.

Scouting Report

Another Synergy feature that is very useful is the Scouting Report that it provides. It gives us a very detailed analysis of the opponent's playing style, top players, tempo, and defensive impact. The Carleton Ravens play the University of Toronto on January 25th at home.
This is the scouting report:

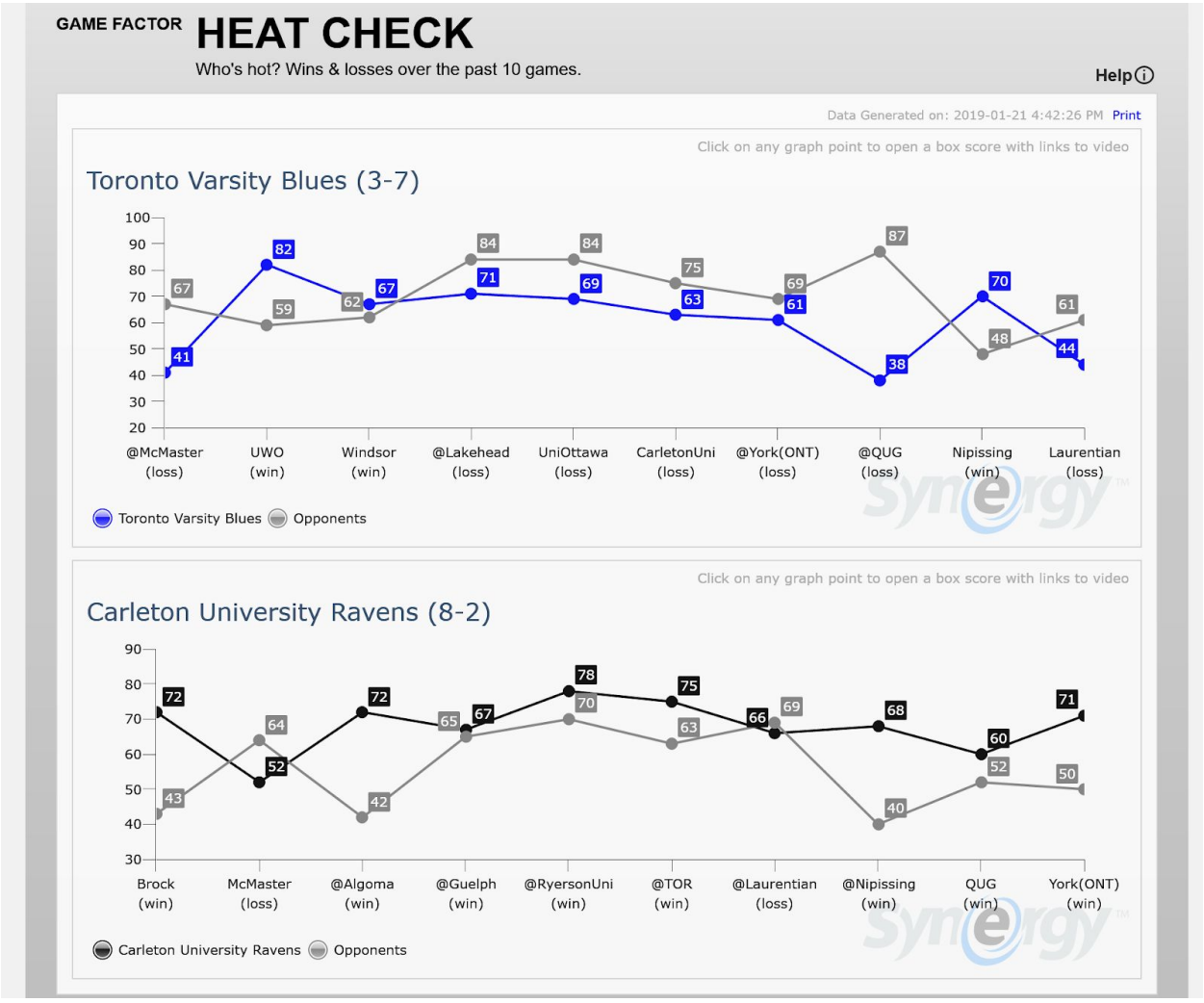

Figure 22: Graphs of the Wins & Losses of the two teams. The Toronto Varsity Blues last 10 games are shown on the top graph where the blue line shows the points history of the Toronto Varsity Blues and the gray line shows their opponents. The numbers represent the team's score. The bottom graph shows Carleton's wins and losses with the black line symbolizing Carleton's points history.

Heat Check allows us to see the wins and losses for the past 10 games. The graph shows opponents and scores. Here we can see that Carleton has won the majority of their games and lost their two games by a smaller average margin. UofT has lost the majority of their games with

a very big loss to Queens a few games ago. Carleton has won their last 3 games whereas UofT lost 2 of their last three games.

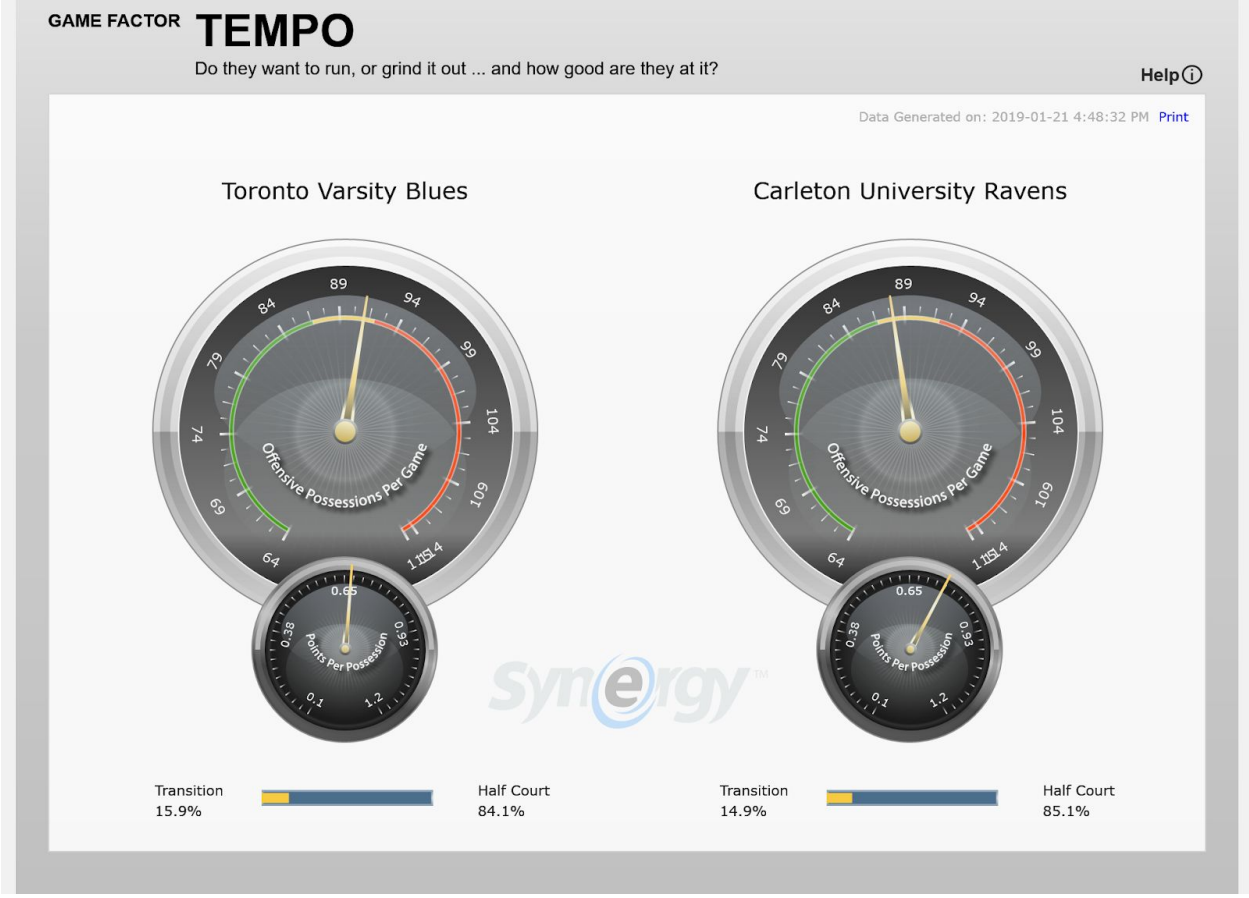

Figure 23: These visuals are speedometers that compare the Offensive Possessions Per Game between Toronto Varsity Blues (left) and Carleton University Ravens (right). The PPP and % of Transition plays are also compared.

Tempo offers dual gauges for matchups, showing preferred tempo and scoring effectiveness. The tempo is the top gauge and it shows the average offensive possessions per game. When teams push the ball, possessions tend to be shorter resulting in more possessions. When teams don't run, they use more clock-resulting in fewer possessions. Offensive rebounds and steals can also have an effect on the number of possessions because those possessions are frequently very short. Offensive rebounds earn extra possessions.
About 15% of teams fall into the red zone, usually indicating they like to run. 60% of teams place in the green zone and 25% in the yellow zone.
The scoring effectiveness is the bottom gauge and is measured in Points Per Possession (PPP). PPP takes into account shots, turnovers and free throws resulting from the possession. Coaches consider PPP the most accurate way to measure offensive output.

Here we can see that Carleton has a slower pace than Toronto does and is on transition less. However, Carleton has a higher PPP indicating that they score more effectively.

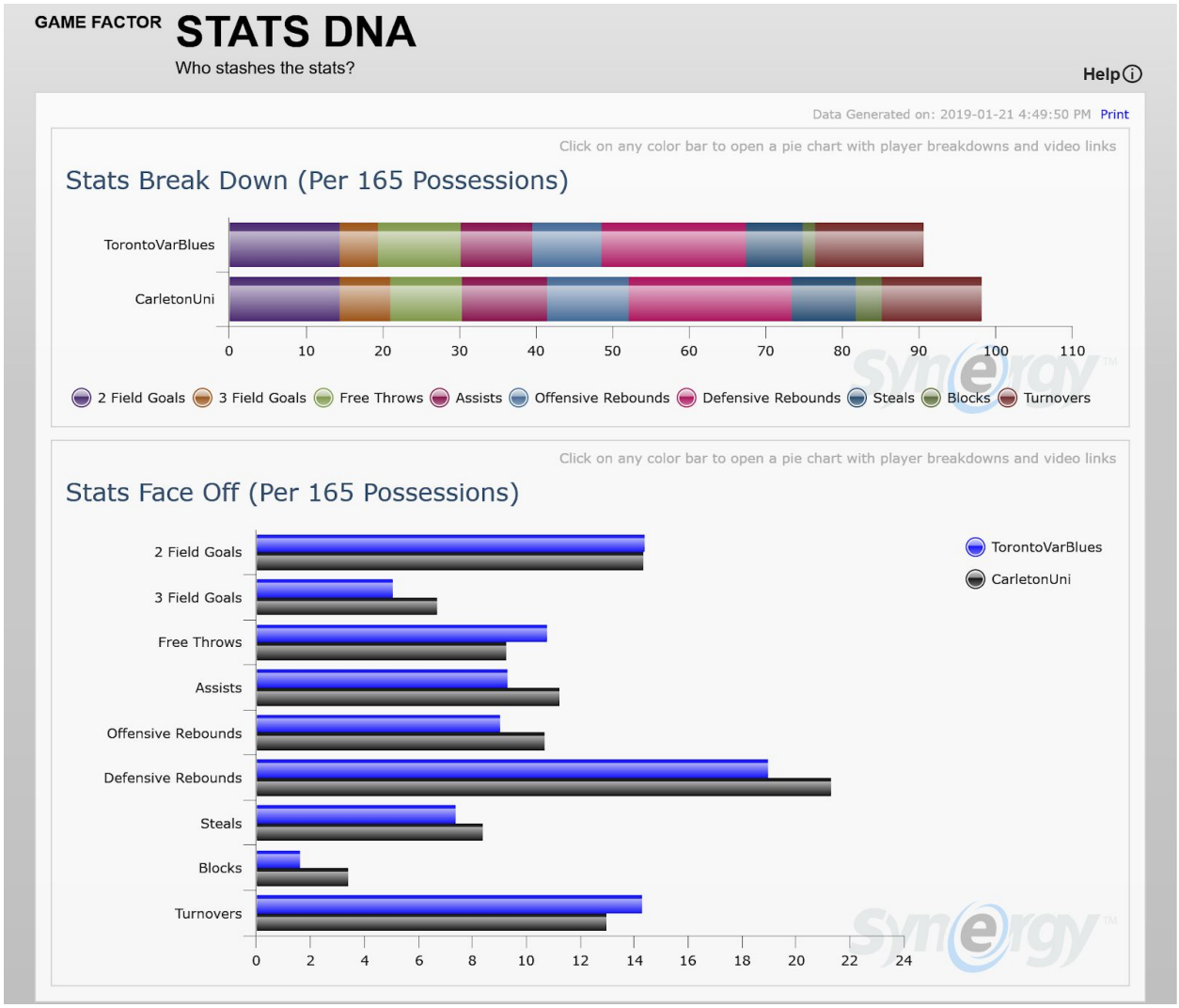

Figure 24: Stacked bar graph of the trams and the statistics shown in the legend. Below are side-by-side bar graphs comparing the statistics per every 165 possessions.

Stats DNA breaks down and compares teams' offensive and defensive stats per 165 possessions - the average number of possessions in a College Women's game. Comparing teams based on the same number of possessions avoids the pitfalls of comparing 'per-game averages.' A high octane running team averages more possessions per game (and therefore more stats) than a deliberate half court team. A 'slow down' team could be much better in terms of statistical efficiency and accumulation of positive stats, however.

The top chart compares all stats for both teams, The lower chart provides head-to-head comparisons in each statistical category.

Carleton University is better than UofT in every aspect except Free Throws and about tied for 2PT FGs. These charts suggest that Carleton has the upper hand for this game.

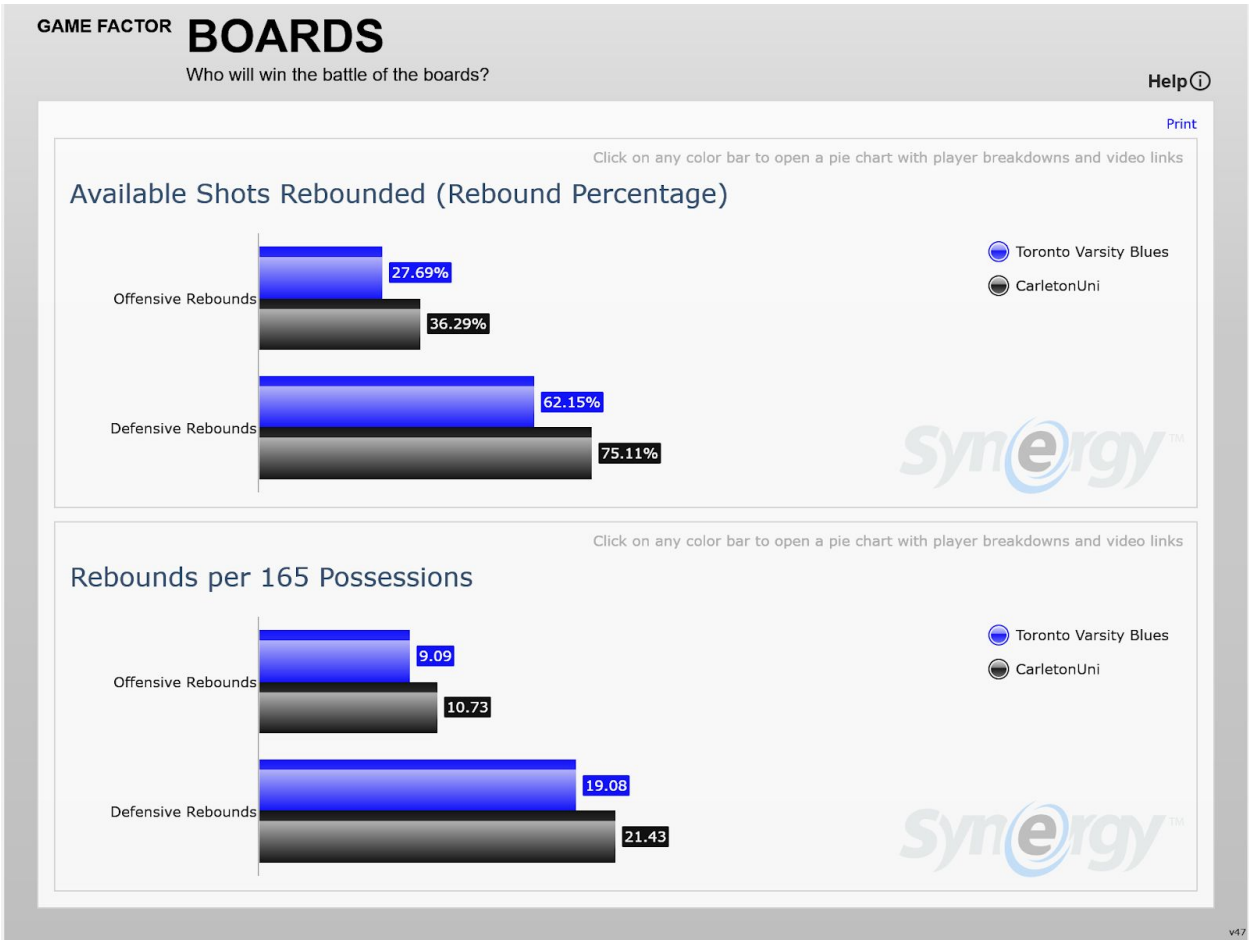

Figure 25: Side-by-side bar graphs comparing the rebound percentage between teams.

These graphs helps us determine which team is better at rebounding for both offensive and defensive.

The top graph breaks down defensive and offensive rebounds based on the percentage of time each team obtains the rebound out of the total number of available rebunds.

The bottom graph breaks down defensive and offensive rebounds based on the number of rebounds per 165 possessions - the average number of possessions in a College Women's game.

Both charts are fairly similar and show Carleton better at rebounding, both offensively and defensively.

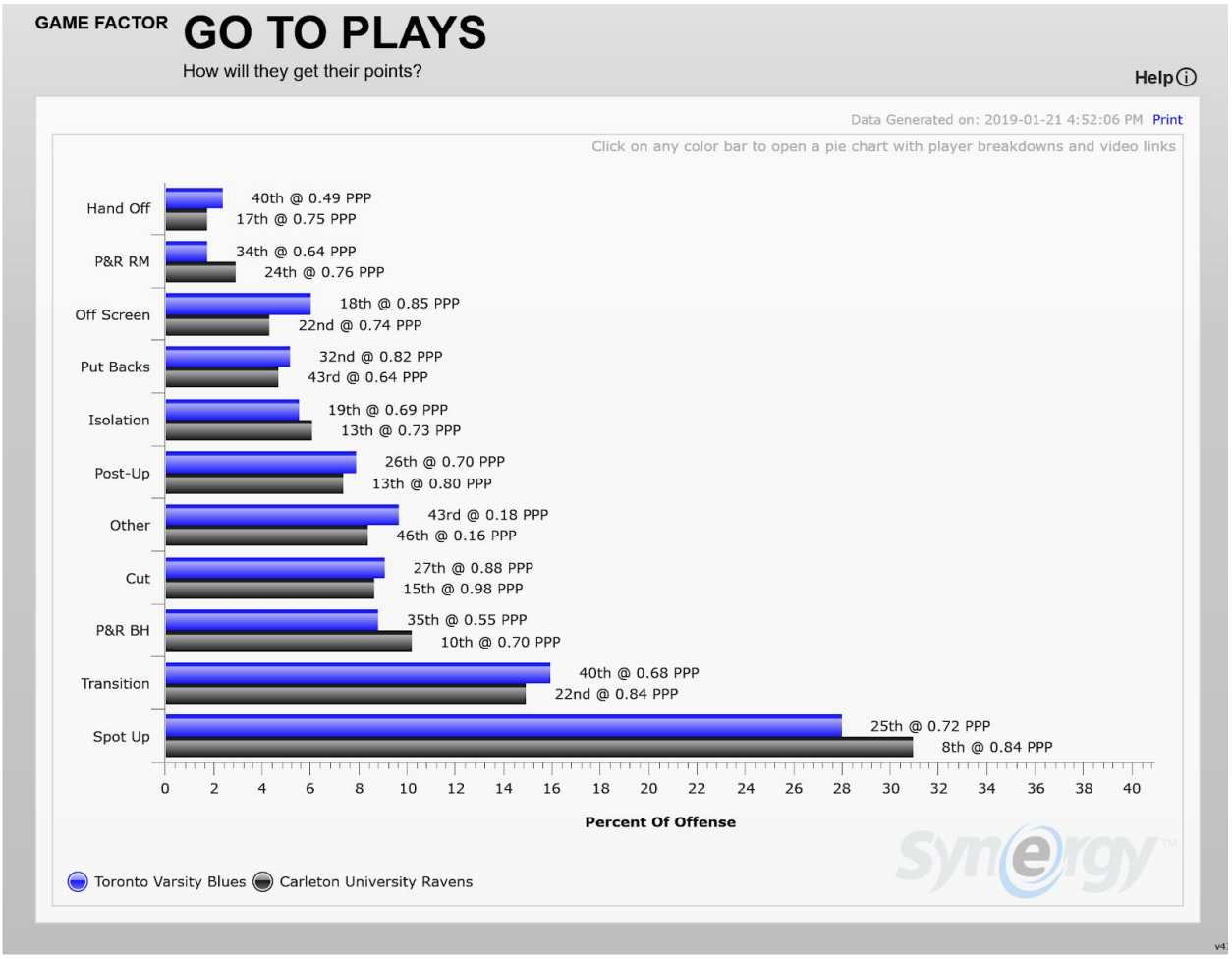

Figure 26: Side-by-side bar graphs of the usage of different plays and their associated points per possessions.

This chart shows us how the teams usually get their points. It breaks down how teams get points as determined by the plays they run.
Synergy logs the standard play types for every possession of every game.
The length of the bars in the chart shows how often each play is run. The team's rank in the league is also displayed to let you know how effective the team is when running the play.
Effectiveness is measured using Points Per Possession (PPP). PPP takes into account shots, turnovers and free throws resulting from the possession.
From this we can see that Carleton's best ranked play is the Spot-Up with 0.84 points per possession. Carleton's most effective play is the Cut with a PPP of 0.98. Carleton is better in most plays compared to UofT.

Synergy's Defensive Impact Report with Toronto on Offense and Carleton on Defense

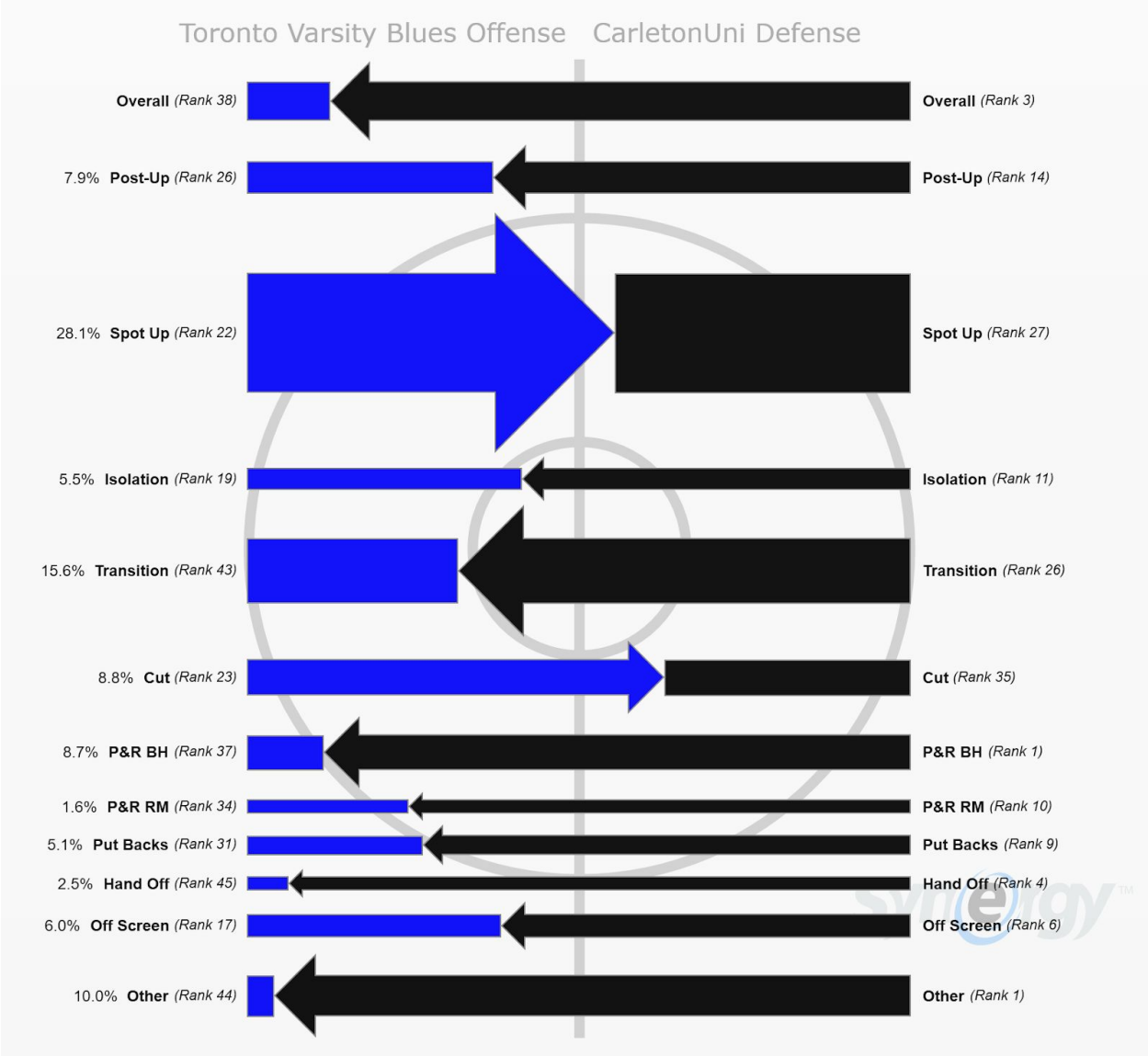

Figure 27: This is a chart comparing the play types of the team. The blue bars on the left are the Toronto Varsity Blues on Offense and the black bars are the Carleton Ravens on Defense.

This graph helps us determine who is vulnerable and where. This is possibly one of the most useful charts provided by Synergy's Scouting Report. It shows the effectiveness of each team's offense versus the other teams' defense.

The thickness of the arrows and bars represents how often the offensive team runs the plays. The length of the arrows and bars represents how effective the teams are on offense or defense for each type of offense. Effectiveness is based on the rank in the league as determined by PPP earned or allowed.

The team with the better stat for a play type receives the arrowhead on its bar. Teams with an arrowhead deep beyond the half court into the opponent's territory can be expected to perform well in that category.

In this chart the blue bars on Offense represents UofT and Carleton is represented by the black arrows. Since there are arrowheads for each of Carleton's black arrows, this means that the team's defense can most likely outperform UofT's offense, which is not surprising considering Carleton is #1 defensively at the moment.

Synergy's Defensive Impact Report with Carleton on Offense and Toronto on Defense

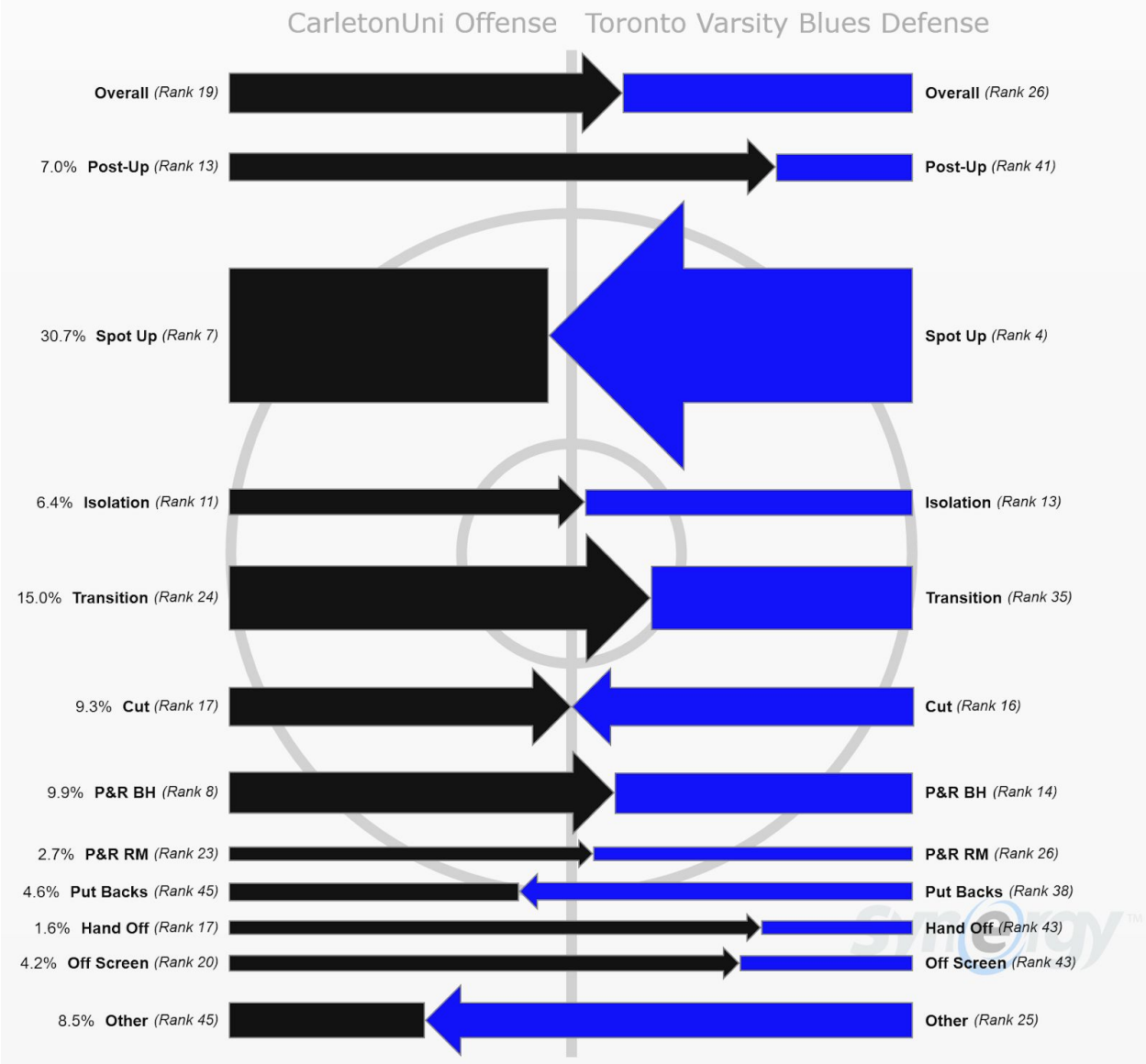

Figure 28: This is the same chart but with Carleton's Offensive Statistics and Toronto's Defensive Statistics.

This chart shows Carleton's offense versus UofT's defense. Carleton does have the upperhand for most offensive plays but UofT does excel in defending the miscellaneous play type, the put-backs and equally match-up against spot-up offense.

Synergy's Star Tracker

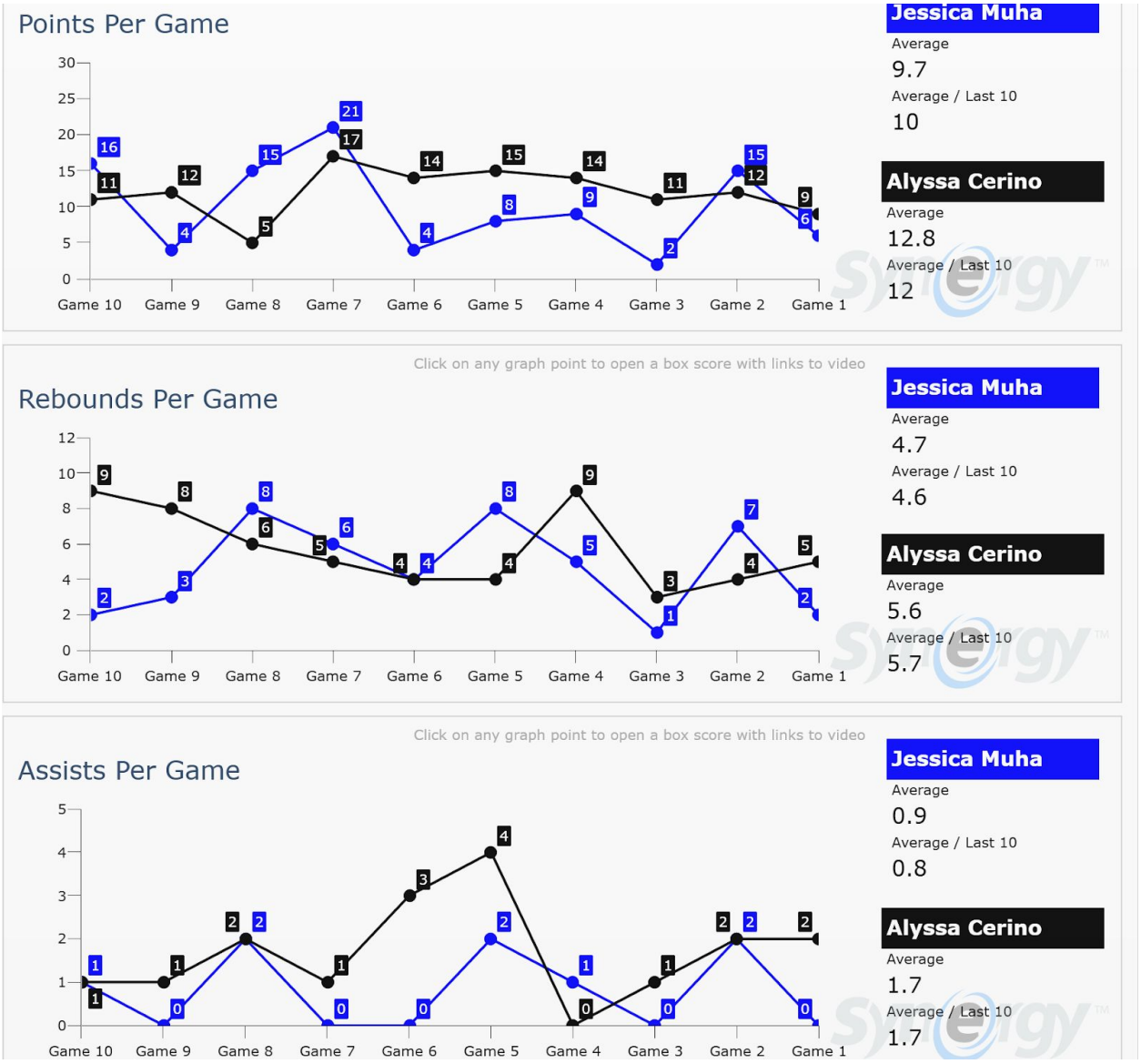

Figure 29: Comparisons of the top players (using Synergy Sports Technology statistic) based on points per game, rebounds per game, and assists per game. The blue line is the history of Toronto's player, Jessica Muha for each of the last 10 games based on the stat mentioned, and the black line is the history of Carleton's player, Alyssa Cerino for each of the last 10 games based on each stat mentioned.

These charts show us which players have been playing the best in the past 10 games for three different categories: Points per game, Assists per game, and Rebounds per game. The star players are selected based on their 'SST Rating' (Synergy Sports Technology's proprietary professional performance rating algorithm. SST evaluates a player's contributions based on all statistical categories, including Synergy's exclusive categories.
Here, we see the difference between the star players per game for each statistic.

Association Rule Learning

Association rule learning is a rule-based machine learning method for discovering interesting relations between variables in large databases. It is intended to identify strong rules discovered in databases using some measures of interestingness. The ultimate goal is to extract and abstract association capabilities from new uncategorized data.
However, since this dataset is not big, it might not have very significant results. In this next update I will add more data by combining data from previous seasons.

I will be implementing this method on the team's game-by-game play type statistics.
The team play type statistics look like this for each game:

Play type grid for the uOttawa vs Carleton game

Play Type Grid

Element Title	Entire Game			First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
	OTT	CAR	Both	OTT	CAR	Both	OTT	CAR	Both	OTT	CAR	Both	OTT	CAR	Both
All Possession Clips	90	92	182	24	23	47	22	21	43	21	22	43	23	26	49
Transitions	17	11	28	3	4	7	5	1	6	3	1	4	6	5	11
All Post-Up	14	2	16	5	1	6	2	1	3	3	0	3	4	0	4
Post-Up - Single Covered	12	1	13	4	1	5	1	0	1	3	0	3	4	0	4
Post-Up - Hard Double Team	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Post-Up - Defense Commits	2	1	3	1	0	1	1	1	2	0	0	0	0	0	0
All P&R Ball Handler	17	18	35	4	4	8	7	5	12	4	5	9	2	4	6
P&R Ball Handler - Single Covered	11	7	18	2	2	4	6	2	8	2	3	5	1	0	1
P&R Ball Handler - Traps	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P&R Ball Handler - Defense Commits	6	11	17	2	2	4	1	3	4	2	2	4	1	4	5
P&R Roll Man	1	5	6	1	1	2	0	2	2	0	0	0	0	2	2
All Isolation	2	8	10	0	1	1	0	2	2	2	2	4	0	3	3
Isolation - Single Covered	1	4	5	0	1	1	0	1	1	1	1	2	0	1	1
Isolation - Defense Commits	1	4	5	0	0	0	0	1	1	1	1	2	0	2	2
Off Screens	6	7	13	0	3	3	2	0	2	1	3	4	3	1	4
Handoffs	3	1	4	0	0	0	0	0	0	1	0	1	2	1	3
Spot Ups	12	35	47	4	7	11	5	12	17	2	8	10	1	8	9
Cuts	11	1	12	4	0	4	1	0	1	4	0	4	2	1	3
All Offensive Rebounds	5	11	16	2	1	3	1	2	3	0	2	2	2	6	8
Off. Reb. - Reset Offense	2	5	7	1	0	1	1	1	2	0	1	1	0	3	3
Off. Reb. - Put Backs	3	6	9	1	1	2	0	1	1	0	1	1	2	3	5
Miscellaneous Possessions	11	12	23	5	3	8	2	2	4	2	3	5	2	4	6

Figure 30: Synergy's play-type game data for uOttawa vs Carleton game.

I will be trying to create rules based on the Carleton Ravens Play types that contribute to wins or losses.

In order to do association mining, it would be best that we make all the variables as factors. Therefore, I've created ranges for each variable and assigned a number for each range.

Variable	**Value**
All Possession Clips	3 corresponds to 90+ 2 corresponds to 80-90 1 corresponds to less than 80
Transitions	3 corresponds to 15-20 2 corresponds to 10-14 1 corresponds to 5-9
All Post-Up	4 corresponds to 15-20 3 corresponds to 10-14 2 corresponds to 5-9 1 corresponds to 0-4
Post-Up - Single Covered	2 corresponds to 5-10 1 corresponds to 0-4
Post-Up - Hard Double Team	2 corresponds to 3-6 1 corresponds to 0-2
Post-Up - Defense Commits	2 corresponds to 3-6 1 corresponds to 0-2
All P&R Ball Handler	7 corresponds to 30+ 6 corresponds to 25-30 5 corresponds to 20-24 4 corresponds to 15-19 3 corresponds to 10-14 2 corresponds to 5-9 1 corresponds to 0-4
P&R Ball Handler - Single Covered	2 corresponds to 6+ 1 corresponds to 0-6
P&R Ball Handler - Traps	2 corresponds to greater or equal to 1 1 corresponds to 0
P&R Ball Handler - Defense Commits	5 corresponds to 20-25 4 corresponds to 15-19 3 corresponds to 10-14 2 corresponds to 5-9 1 corresponds to 0-4
P&R Roll Man	2 corresponds to 4-8 1 corresponds to 0-3
All Isolation	4 corresponds to 15-20

	3 corresponds to 10-14 2 corresponds to 5-9 1 corresponds to 0-4
Isolation - Single Covered	3 corresponds to 8-12 2 corresponds to 4-7 1 corresponds to 0-3
Isolation - Defense Commits	2 corresponds to 3-5 1 corresponds to 0-2
Off Screens	3 corresponds to >= 7 2 corresponds to 4-6 1 corresponds to 0-3
Handoffs	2 corresponds to 2-4 1 corresponds to 0-1
Spot Ups	4 corresponds to >= 40 3 corresponds to 30-39 2 corresponds to 20-29 1 corresponds to 10-19
Cuts	4 corresponds to 15-20 3 corresponds to 10-14 2 corresponds to 5-9 1 corresponds to 0-4
All Offensive Rebounds	2 corresponds to 15-22 1 corresponds to 7-14

Off. Reb - Reset Offense	4 corresponds to >=12 3 corresponds to 9-11 2 corresponds to 5-8 1 corresponds to 0-4
Off. Reb - Put Backs	3 corresponds to 9-12 2 corresponds to 5-8 1 corresponds to 0-4
Miscellaneous Possessions	3 corresponds to 9-12 2 corresponds to 5-8 1 corresponds to 0-4

Figure 31: Table of Variables and associated factors with corresponding variables defined.

After doing these changes to the dataset we can proceed with the association mining using the apriori algorithm. Our Outcome is either a win or a loss. Win is denoted as a 1 and loss is a 0. For our procedure we want to see the associations that lead to either Win = 0 (Loss) or Win = 1. So we use R to compute our set of rules and specify the right hand side to be Win = 0.
This gave us a set of 4597 rules.
Many of our rules have the same measure of lift, support and count.

Association Mining Rules that lead to a loss

	lhs		rhs	support	confidence	lift	count
[1]	{Isolation...Single.Covered=3, Off.Screens=1}	=>	{Win=0}	0.1333333	1	5	2
[2]	{Isolation...Single.Covered=3, Isolation...Defense.Commits=2}	=>	{Win=0}	0.1333333	1	5	2
[3]	{Isolation...Single.Covered=3, Cuts=2}	=>	{Win=0}	0.1333333	1	5	2
[4]	{Post.Up...Single.Covered=2, Isolation...Single.Covered=3}	=>	{Win=0}	0.1333333	1	5	2
[5]	{Isolation...Single.Covered=3, Miscellaneous.Possessions=2}	=>	{Win=0}	0.1333333	1	5	2

Figure 32: The set of apriori rules that lead to a loss, sorted by count.

An example of associations that lead to losses are Isolation - Single Covered between 8-12 possessions, and Off-Screens between 0-3 possessions.

These rules aren't very significant since they are all ties with a low count of 2 and low lift of 5.

We will try to find associations that lead to Win = 1 instead.
This gave us 139324 rules. We will sort the rules by the different measurements: support, lift and confidence (which is the same as lift in this case).

Support is the total percent amount of records found that lead to the outcome (in this case a win)

Lift is a value that gives us information about the increase in probability of the then (consequent) given the if (antecedent) part.

A lift ratio larger than 1.0 implies that the relationship between the support and the result is more significant than would be expected if the two sets were independent. The larger the lift ratio, the more significant the association.

Confidence is the ratio of the number of records that include all items in the result, as well as the the support to the number of transactions that include all items in the antecedent.

Sorting by support we get these different rules:

Association Mining Rules that lead to a win

```
> inspect(rules_1support[1:10])
     lhs                                                rhs     support   confidence lift     count
[1]  {}                                              => {Win=1} 0.8000000 0.8000000  1.000000 12
[2]  {P.R.Ball.Handler...Traps=1}                    => {Win=1} 0.6666667 0.9090909  1.136364 10
[3]  {Off..Reb....Put.Backs=1}                       => {Win=1} 0.6666667 0.8333333  1.041667 10
[4]  {All.Isolation=2}                               => {Win=1} 0.6000000 0.9000000  1.125000  9
[5]  {P.R.Roll.Man=1}                                => {Win=1} 0.6000000 0.8181818  1.022727  9
[6]  {All.Offensive.Rebounds=1}                      => {Win=1} 0.6000000 0.8181818  1.022727  9
[7]  {All.Isolation=2,Off..Reb....Put.Backs=1}       => {Win=1} 0.5333333 0.8888889  1.111111  8
[8]  {P.R.Ball.Handler...Traps=1,P.R.Roll.Man=1}     => {Win=1} 0.5333333 0.8888889  1.111111  8
[9]  {P.R.Roll.Man=1,Off..Reb....Put.Backs=1}        => {Win=1} 0.5333333 0.8888889  1.111111  8
[10] {P.R.Ball.Handler...Traps=1,Off..Reb....Put.Backs=1} => {Win=1} 0.5333333 0.8888889  1.111111  8
```

Figure 33: The set of apriori rules that lead to a win, sorted by support.

Our top rules state that if we keep Pick and Roll Ball Handler -Traps to a minimum it may help contribute to a win. Also keeping the Pick & Roll Roll man to a range between 0-3, and isolation plays between 5-9 possessions may help contribute to a win.

Sorting by lift may be a better measurement to use.
These are the top 10 rules:

Association Mining Rules that lead to a win

```
> inspect(rules_1lift[1:10])
     lhs                                      rhs     support   confidence lift count
[1]  {P.R.Ball.Handler...Defense.Commits=1} => {Win=1} 0.1333333 1          1.25 2
[2]  {All.Post.Up=1}                        => {Win=1} 0.1333333 1          1.25 2
[3]  {All.Isolation=1}                      => {Win=1} 0.1333333 1          1.25 2
[4]  {Spot.Ups=1}                           => {Win=1} 0.1333333 1          1.25 2
[5]  {Post.Up...Defense.Commits=2}          => {Win=1} 0.1333333 1          1.25 2
[6]  {Off.Screens=3}                        => {Win=1} 0.1333333 1          1.25 2
[7]  {Cuts=4}                               => {Win=1} 0.2000000 1          1.25 3
[8]  {Post.Up...Hard.Double.Team=2}         => {Win=1} 0.2000000 1          1.25 3
[9]  {Miscellaneous.Possessions=3}          => {Win=1} 0.2000000 1          1.25 3
[10] {Cuts=1}                               => {Win=1} 0.2000000 1          1.25 3
```

Figure 34: The set of apriori rules that lead to a win, sorted by lift.

According to this, more cuts and off-screen plays may help contribute to winning.

These results may not be very helpful since the dataset is not large but it could possibly be more meaningful after collecting more data.

Investigating Screen Usage

During the season so far I have been in communication with Coach Taffe. We have been trying to find helpful insights that could help the team improve. One thing that Taffe was concerned about was screen usages. He was interested in the outcome of plays involving screens; which players are the most successful in using them, are they using them or not, the effectiveness, etc.

I've watched Offensive Possession clips for the first 10 or so games and recorded which player is the ball handler, which is the one setting the screen (roll man), which player ended up with the ball last, if the screen was set on the left side or the right side, if the screen was used, and what the result of the play was.

I've then created tables using this data to display the findings.

Screen Usage

Yes	No	Total
140	37	177
79.10%	20.90%	

Figure 35*: This is a table of the screen usage for all the possessions with screens not including off-screens As you can see, the screens are used 79.1% of the time with plays involving screens.*

Results of Screen

2FG made	2FG missed	3FG made	3FG missed	Foul	Turnover
32	47	19	36	11	32
18.08%	26.55%	10.73 %	20.34%	6.21%	18.08%

Figure 36: *These are the results of the plays with screens.*

Screens Set

Right	Left
52	125
29.38%	70.62%

Figure 37: *Theses are positions of where the screens are set.*

Pick & Roll Ball Handlers

Alexandra Trivieri	Cynthia DupontLetourneau	Jaclyn Ronson	Nicole Gilmore	Alyssa Cerino	Emma Huff	Madison Reid
27	15	8	37	3	1	86
15.25%	8.47%	4.52%	20.90%	1.69%	0.56%	48.59%

Figure 38: *These are the percentages of the time that these players are the ball handlers.*

Pick & Roll Man

Sydney Fearon	Alyssa Cerino	Deanna Hinds	Jaclyn Ronson	Nicole Gilmore	Alexandra Trivieri	Cynthia DupontLetourneau	Emma Kiesekamp	Karyn Jolicoeur
31	53	13	2	5	1	1	68	3
17.51%	29.94%	7.34%	1.13%	2.82%	0.56%	0.56%	38.42%	1.69%

Figure 39: *These are the percentages of the time that these players are the pick & roll man.*

Roll man when Madison Reid as Ball Handler

Sydney Fearon	Alyssa Cerino	Deanna Hinds	Jaclyn Ronson	Nicole Gilmore	Alexandra Trivieri	Cynthia DupontLetourneau	Emma Kiesekamp	Karyn Jolicoeur
16	32	7	0	1	1	0	29	0
18.60%	37.21%	8.14%	0.00%	1.16%	1.16%	0.00%	33.72%	0.00%

Figure 40: *Now we see who are the roll mans when Madison Reid is the Ball handler*

Result when Madison x Emma

2FG made	2FG missed	3FG made	3FG missed	Foul	Turnover	Total
7	9	1	6	1	5	29
24.14%	31.03%	3.45%	20.69%	3.45%	17.24%	

Figure 41: *These are the results when Madison Reid is the ball handler and Emma Kiesekamp is the Roll Man.*

Result when Madison x Cerino

2FG made	2FG missed	3FG made	3FG missed	Foul	Turnover	Total
6	7	7	8	2	2	32
18.75%	21.88%	21.88 %	25.00%	6.25%	6.25%	

Figure 42: *These are the percentages of the results when Madison Reid is the ball handler and Alyssa Cerino is the Roll Man.*

Player who ends possession when Madison Reid is Ball Handler

Alexandra Trivieri	Cynthia DupontLetourneau	Emma Huff	Jaclyn Ronson	Madison Reid	Sydney Fearon	Alyssa Cerino	Deanna Hinds	Emma Kiesekamp	Karyn Jolicoeur	Nicole Gilmore
4	4	3	6	38	3	14	1	8	1	4
4.65%	4.65%	3.49 %	6.98 %	44.19 %	3.49%	16.28%	1.16%	9.30 %	1.16 %	4.65 %

Figure 43: *The Players that end the play when Madison Reid is the Ball handler.*

Result of Madison Reid as Ball Handler

2FG made	2FG missed	3FG made	3FG missed	Foul	Turnover	Total
16	22	11	16	4	17	86
18.60%	25.58%	12.79%	18.60%	4.65%	19.77%	

Figure 44: *The Results of the play when Madison Reid is the Ball handler.*

Result of Nicole Gilmore as Ball Handler

2FG made	2FG missed	3FG made	3FG missed	Foul	Turnover	Total
5	9	4	8	2	9	37
13.51%	24.32%	10.81%	21.62%	5.41%	24.32%	

Figure 45: *The Results of the play when Nicole Gilmore is the Ball Handler.*

Conclusion

Through the regular season I will try to implement more statistical methods. This report showcased more of the descriptive statistics than predictive but they can still be helpful. In the next report I will try to implement regression, decision trees, bayesian networks, neural networks, categorical data analysis, etc..

Thank you for reading this. There will be more to come.